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ABSTRACT BOOK

Danish Comprehensive Cancer Center

DANSKE MULTIDISCIPLINÆRE CANCER GRUPPER DMCG.dk

Indhold

Exceptional Young Scientist

Abstract: #i-vii

Exceptional Young Scientist Abstract

i: Automated Segmentation of Brain Structures Using Machine Learning,

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Abstract text
Introduction
Patients with glioblastoma (GBM) are treated with surgery, followed by partial brain radiotherapy, which is directed at all visible and invisible residual tumor on a MRI-scan. Together with MRI, mathematical models can guide the radiation field to include the invisible tumor cells. However, these models need knowledge of the individual patients' brain anatomy, especially on boundaries between substructures of the brain. As manual delineation is time-consuming, the aim of this study was to develop a deep learning auto-segmentation tool for four substructures: Cerebellum (also called little brain), Brainstem (the brains connection to the rest of the body), Falx (thin layer separating the left and right brain), and Ventricles (cavity containing brain fluid).

Material & Methods
Data consisted of 122 brain cancer patients in whom all brain substructures had been manually delineated, which were randomly divided into a training (n=97) and test set (n=25). The manual delineations of the training set were then used by the computer algorithm (nnUNet) to learn the respective segmentation tasks.
To evaluate the accuracy of the AI-segmentations, these were compared to the manual delineations in the test set, using Dice Similarity Coefficient (DSC, 1 meaning a complete spatial overlap) and Hausdorff Distance 95% quartile (HD95, i.e. the near largest distance between two segmentations, with 0 meaning they are identical).

Results
The median (range) DSC/HD95 were,
Cerebellum: 0.95 (0.97-0.77) / 2.20 (5.77-1.41),
Brainstem: 0.92 (0.95-0.86) / 2.5 (3.2-1.41),
Falx: 0.81 (0.88-0.73) / 1.55 (5.5-0.91),
Ventricles: 0.89 (0.98-0.63) / 2.5 (14.27-0.5).

Conclusion:
The AI-tool produced overall highly accurate segmentations of the respective brain substructures. These segmentations can guide mathematical models to respect the individual patients' brain anatomy in individualized radiotherapy for GBM.

Exceptional Young Scientist Abstract

ii: Hændelser i det diagnostiske forløb for kræft; en spørgeskemaundersøgelse i almen praksis

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Abstract text

Baggrund:
Rettidig diagnose er afgørende for prognosen ved kræft. En forudsætning er, at den praktiserende læge får mistanke om kræft og indleder udredning. Flere faktorer kan påvirke den diagnostiske proces. I dette studie vil vi undersøge: 1. Hændelser af mulig betydning for udredningsforløbet, 2. Hvortil lægens første henvisning går, samt 3. Betydningen for den praktiserende læges vurdering af den diagnostiske proces.

Materialer og metode:
Alle praktiserende læger i Region Syddanmark blev inviteret til at deltage i en spørgeskemaundersøgelse. Deltagende læger modtog en liste over tilknyttede patienter, der i løbet af en to-årig periode havde fået en ny kræftdiagnose, og udfyldte spørgsmål om den diagnostiske proces, herunder hændelser undervejs i forløbet, første henvisning, og den praktiserende læges vurdering af processen.

Resultater:
I alt deltog 59 almen praksis med tilsammen 2898 patienter diagnosticeret med kræft i 2019 og 2020. 2077 (72%) af patienternes udredningsforløb begyndte i almen praksis. 27 % af patienterne blev behandlet på mistanke om anden sygdom først. 10% angav at have tøvet med at søge læge. Kun i 0.6% af forløbene blev lægens henvisning afvist. For 43% af patienterne var første henvisning i specifikt kræftpakkeforløb, 23% først blev henvist til speciallæge eller anden sygehusafdeling, 17% til billeddiagnostik og 4% blev henvist til diagnostisk center. Såvel henvisning til billeddiagnostik og praktiserende speciallæge som anden sygehusafdeling var associeret til en dårligere vurdering af forløbet sammenlignet med henvisning i specifik kræftpakke.

Konklusion:
Mere end hver fjerde patient i kræftudredningsforløb behandles eller henvises på mistanke om anden sygdom først. Knap halvdelen henvises direkte i en specifik kræftpakke. De praktiserende læger vurderer, at det overordnede diagnostiske forløb er bedst for denne gruppe af patienter.

Exceptional Young Scientist Abstract

iii: Monocytosis in primary care and risk of hematological malignancy

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Abstract text

Introduction
Monocytosis (> 1.0 x109/L) is the hallmark of chronic myelomonocytic leukemia (CMML) but may be present in a plethora of diseases. WHO recommends referral to a hematological specialist when encountering unexplained, sustained monocytosis, but many of these patients do not have hematological malignancy. We aimed to evaluate the value of monocytosis in predicting hematological malignancy in a primary care population.

Materials and Methods
We included complete blood cell counts (CBC) from patients in the Copenhagen Primary Care Laboratory Database (CopLab) encompassing laboratory results from primary care patients from the greater Copenhagen area, 2000-2015. Monocytosis was grouped according to clinical cut-offs (normal range, subclinical monocytosis and manifest monocytosis). We also did an analysis defining the exposure variable 'sustained monocytosis' as monocytosis > 3 months. Multiple logistic regression was used to model the association between monocytosis and hematological disease within 3 years. Hematological diagnoses came from the Danish Cancer Register. Co-variates included age, sex, fortune, Charlson Co-morbidity Index, C-reactive protein and previous monocytosis. All were extracted via CopLab or Statistics Denmark.

Results
In 663.184 patients 4,6 % had monocytosis in their index CBC. For these patients the relative risk of any type of hematological malignancy was 3,3 compared to normal range. For CMML, the odds ratio (OR) was 105 with manifest monocytosis, OR 140 with sustained monocytosis. However, actual numbers were low with only 0.1 % of patients with manifest monocytosis developing CMML.

Conclusions
Monocytosis increases the relative risk of hematological malignancy considerably especially for CMML, but the actual incidences are very low in primary care. Sustained monocytosis increases the risks even further underlining the prudence in repeated measurements if the cause of the monocytosis is not apparant

Exceptional Young Scientist Abstract

iv: SFRP1 promoter hypermethylation: a prognostic and predictive blood-based biomarker in patients with stage IV pancreatic ductal adenocarcinoma

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Abstract text

Background:
Pancreatic ductal adenocarcinoma (PDAC) is a disease with an abysmal prognosis. Currently, no reliable prognostic or predictive blood-based biomarkers are available. Analysis of genetic and epigenetic alterations in cell-free DNA is a promising prognostic and predictive tool in cancer. A promoter hypermethylation (ph) of SFRP1 was recently linked to poor prognosis in gemcitabine-treated patients with stage IV PDAC. This study examined phSFRP1 as a prognostic and predictive biomarker in FOLFIRINOX-treated patients with stage IV PDAC.

Methods:
Based on bisulfite treatment, we conducted methylation-specific polymerase chain reaction analysis of the promoter region of the gene SFRP1. Kaplan-Meier curves, log-rank tests, and Cox regression analysis were used to assess survival.

Results:
Fifty-two FOLFIRINOX-treated patients with stage IV PDAC were included in the study. Patients with phSFRP1 (n=23) had a median overall survival (mOS) of 6.8 months, significantly shorter than patients with unmethylated (um) SFRP1 (n=29) who had a mOS of 15.7 months ($p<0.01$). Likewise, in crude and adjusted Cox-regression analysis, patients with phSFRP1 had an hazard ratio of 2.78 (95% CI 1.55-4.99) and 2.82 (95% CI 1.55-5.14), respectively, compared to patients with unmethylated SFRP1.

Conclusions:
FOLFIRINOX-treated stage IV PDAC patients with phSFRP1 have significantly shorter survival than patients with umSFRP1. Combined with previous literature, this indicates the potential value of phSFRP1 as a blood-based predictive biomarker in patients with stage IV PDAC treated with standard palliative chemotherapy. This knowledge may facilitate individualized treatment of patients with stage IV PDAC. Additionally, SFRP1 may be a valuable target for treatment with hypomethylating drugs.

Exceptional Young Scientist Abstract

v: Perceived susceptibility to depression among Danish women with newly diagnosed breast cancer

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Abstract text
Introduction:
Women with breast cancer are at significantly increased risk for depression, compared to the background population. Little is known about whether women perceive themselves to be susceptible after their cancer diagnosis, and whether prior experience with and beliefs about depression are associated with perceived susceptibility.

Materials and methods:
We consecutively invited all women newly diagnosed with primary breast cancer at the Department of Breast Surgery at Rigshospitalet and Herlev Hospital between April and October 2021 to complete a questionnaire assessing depressive symptoms (major depression inventory), perceived susceptibility to depression, prior experience (own or close relatives' prior depression), and beliefs about depression (based on the Health Belief Model). We analyzed the prevalence of elevated depressive symptoms, and the proportion of women who perceived an elevated risk for depression after their diagnosis. We plan to investigate associations between perceived susceptibility and depressive symptoms, beliefs about depression, and prior experience in regression analyses.

Results:
Of 464 eligible women, 246 (53%) participated. Thirty-five women (14%) reported mild to severe levels of depressive symptoms. Almost half of the women (N=122, 50%) perceived their susceptibility to depression to be increased after the cancer diagnosis. Results of regression analyses are ongoing.

Conclusions:
Although women with breast cancer have significantly greater risk for developing depression than the background population, women may overestimate this risk. We will present further results, relating women's perceived susceptibility to beliefs about depression.

Exceptional Young Scientist Abstract

vi: Fælles beslutningstagning om behandling ved recidiv af højgradsgliom – hvad er vigtigt for patienter og pårørende?

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Abstract text

Introduktion
Højgradsgliomer (HGG) er de mest aggressivt voksende hjernetumorer med en gennemsnitlig overlevelsestid på under to år og alle patienter oplever recidiv. Både sygdom og behandling har store konsekvenser for patienten og familiens hverdagsliv. Involvering af patienter og pårørende i afvejningen af fordele og ulemper er derfor imperativ. Dette studie er del af et større projekt omkring fælles beslutningstagning i forbindelse med recidiv af HGG. Formålet med indeværende studie er at undersøge, hvad der er vigtigt for patienter og pårørende i forbindelse med beslutningsprocessen.

Materialer og metoder:
Individuelle semistrukturerede interviews med patienter og deres pårørende blev udført i ugerne efter de havde truffet beslutning om behandling i forbindelse med et recidiv. Interviewene blev analyseret med afsæt i en fænomenologisk hermeneutisk tilgang.

Resultat:
I alt deltog 29 patienter og pårørende. Tre temaer havde betydning for en god beslutningsproces: 1) Patienter og pårørende ønskede at blive aktivt involveret i beslutningstagningen. De pårørende var en stor støtte for patienten og det var vigtigt, at de pårørendes rolle blev anerkendt af de sundhedsprofessionelle. 2) Balanceret og individuelt tilpasset information samt en tillidsfuld relation til lægen var afgørende. 3) Håbet om et bedre eller længere liv havde væsentlig betydning for vurderingen af risici og den endelige beslutning.

Konklusion:
Flere faktorer påvirker patienter og pårørende i forbindelse med beslutningen om behandling for recidiv af HGG. Eksempelvis ønsket om at blive aktivt involveret, anerkendt for sin pårørende-rolle, relationen og kommunikationen med lægen samt betydningen af håb. I implementering af fælles beslutningstagning er det essentielt at være opmærksom på dette for at sikre patienter og pårørende den nødvendige støtte.

Exceptional Young Scientist Abstract

vii: Adherence to follow-up after non-negative HPV-tests among women aged 60-64 and the derived resource use: A register-based cohort study

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Abstract text.

Introduction:
Human papillomavirus (HPV) testing is more sensitive for the detection of high-grade cervical intraepithelial neoplasia.

In Denmark before 2021, HPV testing was used only for women aged 60-64. After a negative primary screening test, women were discharged from cervical cancer screening. Women with positive HPV tests were referred to colposcopy or for a new test in 12 months. The aim of this study was to investigate the adherence to recommended follow-up after non-negative HPV tests and to estimate the derived resource use during the entire follow-up.

Materials and methods:
We included 2,926 women aged 60-64 years who received a positive or an inadequate screening result when attending primary HPV screening between March 2012 and end of 2016. These women were followed through their pathway of followup.

All relevant follow-up tests and procedures were retrieved from the Danish health registers, and the data were linked at the individual level. We estimated the total numbers of tests and diagnostic procedures utilised during the follow-up, and determined to what extent the patterns followed the national recommendations for follow-up.

Results:
Mapping the entire follow-up pathways revealed extensively long follow-up paths for a non-negligible proportion of the women. Only 26% of the women had follow-up in complete accordance with the guidelines, 50% had insufficient follow-up care and 24% had follow-up beyond the recommended. Resource use was also higher than expected based on the recommendations and even insufficient follow-up care was associated with more extensive use of certain diagnostic procedures.

Conclusion:
With our comprehensive mapping of the real-life follow-up patterns among women with abnormal primary HPV screening, we found that the patterns often diverged from the recommendations. Addressing inconsistencies in follow-up should help improve the cancer screening programs and secure an equal and reliable follow-up care service for all women.

Flash Talks:

Poster #I-XII

Flash Talks

I: High Incidence of Cardiovascular Disease in Curatively Treated Patients with Esophageal Cancer – A Registry-Based Cohort Study

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Abstract
Introduction
The cardiovascular disease (CVD) burden among patients with esophageal cancer (EC) treated with curative intent is unclear. Purpose To determine CVD incidence and all-cause mortality in patients with EC.

Material and Methods
Danish national health registries were used to identify patients diagnosed with primary EC between 2008 and 2018. Each EC patient was matched with ten individuals from the general population. The primary endpoint was a CVD hospital contact (CVD-HC), either admission or outpatient contact.

Results
The study included 1,525 patients with EC. Patients with EC had a post-diagnosis one-year adjusted hazard ratio (HR) of CVD-HCs of 6.1 (95% CI: 5.6 to 6.8) compared with the general population. During the next nine years, the risk of CVD-HC was comparable between the two cohorts with an adjusted HR of 1.0 (95% CI: 0.9 to 1.3). Patients with EC, particularly those with prevalent CVD, had a high risk of atrial fibrillation, ischemic heart disease, and venous thromboembolism within the first year after EC diagnosis. Prevalent CVD among patients with EC did not appear to be associated with higher mortality.

Conclusions
CVD morbidity was transiently increased in the first year following EC diagnosis compared with the general population. All-cause mortality risks were high but did not appear to be affected by prevalent CVD. The very high risk of CVD in curatively treated patients with EC calls for healthcare initiatives to advance preventive and post-treatment strategies.

Flash Talks

II: Effects of chemotherapy dose reductions in overweight and obese patients with acute myeloid leukemia – A danish nationwide cohort study

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Abstract
Introduction
Studies in solid cancers have shown that overweight and obese patients frequently receive dose reduction (DR) of chemotherapy, relative to weight-based doses, despite little evidence of increased toxicity from full dosing. Rather, DR has been shown to result in shortened overall survival (OS). Current evidence regarding DR among overweight patients with acute myeloid leukemia (AML) is limited. The purpose of this study was to investigate the association between DR and outcome in overweight patients with AML.

Materials and methods
We utilized the Danish National Acute Leukemia Registry to conduct a retrospective cohort study. Overweight (BMI≥25) AML patients aged 18-75 years and treated with IC between 2000-2012 were included. We defined DR as ≤95% of actual BSA-based chemotherapy dose. Relative risks (RR) for DR, complete remission (CR) rates, and 30- and 90-day mortality were modeled, and OS and relapse-free-survival (RFS) were calculated and compared using the 5-year restricted mean survival time difference (Δ5y-RMST).

Results
The study cohort included 536 overweight AML-patients of whom 54 patients (10.1%) were categorized as DR (mean reduction 11.2%). No significant differences were observed for rates of CR, 30- and 90-day mortality between patients receiving DR and non-DR IC. Dose reduction did not affect median RFS (DR, 14.5 [95% CI, 9.0-41.7] months; non-DR, 15.0 [12.3-19.3]) with an adjusted Δ5y-RMST of 0.2 (-8.4-8.8) months nor median OS (DR, 17.0 [11.9-45.5] months; non-DR, 17.5 [14.8-20.5]) with an adjusted Δ5y-RMST of 0.8 (-5.7-7.3) months. Sensitivity analyses using a case-matched cohort and ≤90% cut-off to define DR led to the same conclusions.

Conclusions
Our results suggest that IC dose reduction does not adversely impact AML outcomes including 30- and 90-day mortality, rates of CR, RFS and OS. However, we encourage future prospective clinical studies to address this question of dose reduction in overweight patients with AML.

Flash Talks

III: A RCT for the evaluation of a biomarker panel for the detection of aggressive prostate cancer. DaProCa4

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Abstract
Introduction
The diagnosing of prostate cancer requires biopsy of the prostate. This procedure has inherent risks and may yield false negative results. In addition, patients with indolent prostate cancer are over-diagnosis and eventually over-treatment. The primary objectives were to assess the ability of a biomarker panel to reduce the number men who needed biopsies, and to reduce the detection of indolent cancers, while maintaining the same detection rate of aggressive prostate cancer. The study was supported by Danish Prostate Cancer Group, AgeCare, and the Danish Cancer Society.

Methods
Inclusion criteria: Informed consent, suspicion of prostate cancer, indication for biopsy, age ≥ 70 years, PSA ≤ 50 ng/ml. Patients were randomization 1:1. The standard arm; prostate biopsy. The experimental arm; the biomarker panel was used to decide if biopsy of the prostate was needed. The biomarker panel included mRNA from urine and blood. The panel was combined with clinical parameters in an algorithm. The study was planned to include 700 patients.

Results
The study initiated in 2019. In fall 2021, the second interim analyses was performed after 205 patient had entered the study. Due to a significant lower detection of aggressive prostate cancer in the experimental arm, the inclusion was stopped and crossover from experimental arm was offered. The patients had a median age of 75 years, median PSA of 8, prostate size of 57 cm3. When comparing the two arms we found a reduction in the need of biopsies in the experimental arm by 32% (83 vs. 56), a reduction in the diagnosis of indolent cancer by 44% (18 vs. 8) , and a reduction in the diagnosing of aggressive cancer by 24% (37 vs. 28).

Conclusion
The selected biomarker panel could reduce the number men who needed biopsies taken, and detection of indolent cancers, however it was on the cost of a lower detection of aggressive cancers. Consequently, we cannot recommend the biomarker panel for clinical implementation.

Flash Talks

IV: Dahanca 35: Cohort matched analysis of acute toxicities in the pilot study

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Abstract
Introduction
DAHANCA 35 is a Danish national study investigating the value of proton treatment in patients with pharynx and larynx cancer selected by a normal tissue complication probability models. In the present study, we compared acute toxicities between proton and photon-treated patients until two months after treatment.

Materials and methods
62 patients treated with protons in the pilot study were matched to 124 patients who received photon treatment as recorded in DAHANCA database. Patients were matched on the treatment centre, concurrent chemotherapy, tumour site, TNM stage, p16 status for oropharynx cancers, and radiation dose as prescribed.

Results
Baseline characteristics between groups were well balanced, except for the type of drug used concurrently; more photon patients received Carboplatin (21.2% vs 5.8%, p=0.01). Proton therapy was associated with significantly less weight loss at the end of treatment, mean weight loss of 3% for protons and 5% for photons (p<0.001). At the end of treatment, the risk of ≥5% weight loss was also significantly lower for protons (Relative Risk (RR) 0.5; 95% CI: 0.3-0.8, p=0.002). There were statistically significant more grade 3 skin reactions and grade 3 mucositis after proton treatment compared with photons at the end of treatment, RR 1.9 (95% CI: 1.01-3.5, p=0.04) and RR 1.5 (95% CI: 1.3-1.7, p<0.001), respectively, which resolved two months after treatment. There were no significant differences between groups on opioid use, use of feeding tubes, or hospitalisation during the observation period.

Conclusion
Proton treatment was associated with less weight loss but increased skin and mucosa toxicity at the end of the treatment. The differences were transitory. The ongoing randomised part of Dahanca 35 is ongoing.

Flash Talks

V: Cellular responses in peripheral blood to cancer immune therapy investigated with multiple parametric flow cytometry and machine learning techniques in metastatic malignant melanoma patients

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(2) Novo Nordisk Foundation Center for Protein Research

Abstract
Immune therapy with checkpoint inhibitors (CPIs) targets patient immune regulation.
Successful therapy is likely to induce a systemic immune response to the cancer that can be monitored in peripheral blood but no validated biomarkers correlating to successful or unsuccessful response are available. The composition of the immune system can investigated with flow cytometry of peripheral blood but with multiparametric analyses, machine learning techniques are becoming a necessary tool for analysis.

We analyzed peripheral blood mononuclear cells (PBMCs) from blood of 90 patients with metastatic malignant melanoma before and 12 weeks after immune therapy with multiparametric flow cytometry to investigate specific responses to therapy using Uniform Manifold Approximation and Projection (UMAP) for data analysis.

We found that the general composition of the immune system in regards to both lymphocytes and monocytes was dramatically changed after 12 weeks of immune therapy.

We also found that clinical objective response to therapy was significantly associated to a relative increase of Central Memory CD4 T-cells and a particular subsets of Naïve CD4 cells while non-responders showed a significant increase in terminally differentiated CD8 T-cells.

Flash Talks

VI: Prognostic impact of circulating methylated Homeobox A9 DNA in patients undergoing treatment for recurrent ovarian cancer

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Abstract
Objective
Recurrent ovarian cancer (OC) remains a clinical challenge with considerable mortality and low response rates to chemotherapy. An applicable biomarker to support treatment decisions and identify the subgroup who will benefit from treatment is lacking.
Circulating tumor specific methylated Homeobox A9 DNA (meth-HOXA9) has been suggested as a new blood-based biomarker in OC, although its prognostic significance remains unproven. The aim of the present study was to investigate the prognostic impact of meth-HOXA9 in plasma from patients with recurrent OC.

Methods
Blood samples were prospectively collected from patients receiving treatment for recurrent OC. DNA was extracted from 4 mL plasma, and following bisulfite conversion meth-HOXA9 was analyzed using methylation specific droplet digital PCR. Detection of meth-HOXA9 was reported as a percentage of total cell free DNA and as a binary variable (detectable and undetectable). Meth-HOXA9 status and its dynamics during treatment were correlated with overall survival (OS) as the primary endpoint.

Results
A total of 126 patients was included. At baseline meth-HOXA9 was detected in 65.9% (83/126) of the patients. The median OS was 8.9 and 17.9 months in patients with detectable and undetectable meth-HOXA9 at baseline, respectively (Hazard ratio: 2.04, 95% confidence interval: 1.29-3.23, p=0.002), which remained significant in the multivariate analysis. Median OS in patients with an increase in meth-HOXA9 after one treatment cycle was 5.3 months compared to 33 months in patients with undetectable meth-HOXA9 ($p<0.001$). A similar difference was observed after the second and third treatment cycle ($p<0.001$ and $p=0.05$).

Conclusion
Meth-HOXA9 is significantly related to poor survival and may serve as a valuable prognostic marker in patients with recurrent OC. Longitudinal monitoring of meth-HOXA9 is clinically feasible with the perspective of aiding clinical decision making.

Flash Talks

VII: Breast induration versus irradiated breast volume in the phase III randomized Danish Breast Cancer Group Partial Breast Irradiation trial: volume matters

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Abstract
Introduction
The Danish Breast Cancer Group (DBCG) Partial Breast Irradiation (PBI) trial randomized selected early breast cancer patients to PBI versus whole breast irradiation (WBI) using external-beam 40Gy in 15 fractions. 3 years after radiation therapy the relation between breast induration grade 2-3 and irradiated breast volume was investigated.

Materials and methods
Treatment plan data were obtained from the Danish radiotherapy plan database. Information about breast induration was obtained from the DBCG database. The volume of the whole breast treated to various dose levels was determined for both PBI and WBI treatment plans. A model was developed using logistic regression with log-transformed volumes.

Results
865 patients were available for analysis. PBI and WBI was given to 433 and 432 patients, respectively. Median and interquartile ranges (IQR) for breast volume were 710mL (467-963mL; PBI) and 666mL (443-1012mL; WBI) (p=0.98). The median and IQR for breast volume treated to ≥40Gy was 24.9% (18.6-32.1%; PBI) and 58.2% (53.3-67.3%; WBI). Induration scores at 3 years were available for 368 PBI and 375 WBI patients of which 18 (5%) and 39 (11%) patients had grade 2-3 induration, respectively. From the logistic regression, a dose-response relationship was established between irradiated breast volume and risk of breast induration. From the model 5% and 10% risks of breast induration were observed for 40Gy delivered to breast volumes of 176.4mL (95% CI, 94.8-257.9) and 419.1mL (95% CI, 282.7-555.6), respectively.

Conclusions
The frequency of breast induration increased significantly with increasing irradiated breast volume strongly favouring small volumes and PBI. No difference in breast volume was observed among the patients in the two treatment arms. Thus, treated breast volume rather than the breast size itself is a risk factor for induration. This is the first report directly linking the 40 Gy irradiated breast volume to breast induration.

Flash Talks

VIII: Dietary Intervention against Gastrointestinal Symptoms after Treatment of Cancer in the Pelvic Organs

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Abstract
Introduction
Late adverse effects including gastrointestinal (GI) symptoms are common in patients, who receive radiotherapy, chemotherapy and surgery for cancer in the pelvic organs. The most well described factors contributing to GI symptoms are small intestinal bacterial overgrowth (SIBO) and Bile Acid Malabsorption (BAM). The aim of the present study was to report the additive efficacy of dietary intervention to medical treatment in patients with late GI sequelae to treatment of cancer in pelvic organs.

Materials and methods
In this prospective cohort study performed at a tertiary centre from April 2018 to December 2021, we consecutively included patients with medical intractable late adverse GI symptoms for specialist dietitian guidance. GI symptoms and QoL were assessed before and after dietary intervention by validated questionnaires. Data was analysed using the Wilcoxon signed-rank test and the paired sample t- test. P-values< 0.05 were considered significant.

Results
In total, 89 patients were referred for dietary intervention. A low fat diet was commenced in 44 (49 %), a dietary modification of the fibre content in the diet in 19 (%) patients, a gluten free diet in 1 (%)patient, a low FODMAP diet in 19 (21%) patients, and other dietary advice in 6 (7%) patients. We observed improvement of the following outcomes: quality of life (EQ5D scale) ($p<0.01$), urgency ($p<0.05$), bowel function for the last four weeks ($p<0.02$), performing usual activities ($p<0.04$), stool frequency ($p<0.02$), stool consistency ($p<0.03$), and incomplete emptying ($p<0.01$).

Conclusions
With appropriate dietary intervention, symptoms and quality of life can be improved significantly in patients with late GI sequlae following cancer treatment in the pelvic organs. The dietary guidance should be individually tailored depending on the patients' main symptoms and underlying pathophysiology.

Flash Talks

IX: Prevention of oxaliplatin-induced peripheral neuropathy – a randomized controlled trial: OxaNeuro

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Abstract
Introduction
Chemotherapy-induced peripheral neuropathy (CIPN), a well-known late effect to Oxaliplatin which has seen to induce CIPN in almost 60% of cancer patients treated with adjuvant oxaliplatin. Symptoms seen to persist in 20% 5 years after exposure. There is no treatment for CIPN. The present strategy to prevent CIPN is to reduce the dosage or terminate the potentially life-saving treatment. One among many proposed mechanisms of CIPN are neuroinflammation and modulation of the immune response.
N-3 poly unsaturated fatty acids (PUFA), docosaexaenoic acid (DHA) and eicosapentaenoic acid (EPA), are crucial for the development and functioning of the nervous system. Their anti-inflammatory effect is also well-known. Some clinical studies have shown promising results of PUFAs in preventing CIPN.
The primary objective is to examine if a high dosage of PUFAs reduces the incidence and severity of CIPN 8 months after adjuvant oxaliplatin in patient with high-risk colorectal cancer.
Secondly, we want to investigate PUFAs effect on nutritional status, cognition and mental status. Thirdly want to explore Inflammatory mechanisms and biomarkers of CIPN in skin biopsies and blood.

Materials and methods
A multicenter investigator-initiated, randomized clinical trial including 120 patients operated for colon cancer and candidates to receive adjuvant oxaliplatin and capecitabin for 3 months. Intervention group will receive capsules of fish oil in an anti-inflammatory dosage (3.0 g/d of DHA + EPA). Control group will receive capsules with corn oil in daily for 8 months.
The study comprises 6 visits in which neurological and sensory examination as well as skin biopsies will be carried out at baseline and at the trial end. Questionnaires, impedance weighing and blood sampling will be done at every visit.

Results
Patient enrollment is planned to start 01062022 and run for approx. 1 year.

Conclusions
This study will provide information of a possible effect of PUFA on CIPN.

Flash Talks

X: Increased RBE at the distal edge of the proton SOBP in an in vivo model of early normal tissue damage

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Abstract
Introduction
In radiotherapy, protons display a favorable dose-depth distribution that spare the surrounding normal tissues and a different biological response compared to conventual radiation with photons. To account for the biological difference, a relative biological effectiveness (RBE) of 1.1 is used in the clinic. This translates into a 10% lower prescribed dose of protons compared to photons. However, the RBE varies with different factors. In vitro studies show that there are more cells killed towards the end of the particle track with an abrupt increase at the distal edge of the Spread-out Bragg peak (SOBP), demonstrating an increased RBE.
To link in vitro data to standard of care treatment in vivo data is needed. The aim of this study is to quantify the RBE at the distal edge in a model of early normal tissue damage between protons and protons.

Materials and methods
362 C3H/HeNRj mice were included. The mice were fixated in jigs and placed with their right hind leg submerged into a water phantom. The mice legs were irradiated with a single dose of proton beam, and as reference, a clinical 6MV photon beam. For proton radiation, the leg was placed in the SOBP center (LETd=1.2 keV/µm) or at the distal edge SOBP (LETd=8.4 keV/um). The endpoint was acute moist desquamation of the skin within 30 days post irradiation.

Results
The ED50 (dose producing skin damage in 50% of mice, with 95% confidence interval) was 33.2Gy (31.9-34.4Gy) (distal edge SOBP), 35.8Gy (34.8-36.8Gy) (SOBP center) and 37.5Gy (36.2- 38.9Gy) (photons). The proton ED50 was significantly lower than for photons at the distal edge SOBP (RBE=1.13 (1.07-1.19)), but not at the SOBP center (RBE=1.05 (1.00-1.10)).

Conclusions
The biological effect was enhanced at the distal edge of the SOBP, and the study thus demonstrates an increase in RBE toward the distal edge for early reacting normal tissue for high single doses.

Flash Talks

XI: Implementation of clinical guidelines in clinical practice. Data from the national improvement project in specialized palliative care

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Abstract
Introduction
A national project aimed at improving the quality of life of patients admitted to specialized palliative care services in Denmark by implementing four clinical guidelines for the treatment of pain, dyspnea, constipation and depression. We aimed to investigate to what extent clinicians implemented the treatment guidelines by evaluating 1) the proportions of patients admitted to palliative care who qualified for (i.e. reported severe symptom level) and received interventions following the guidelines, 2) the proportion of patients who qualified and received interventions in palliative care services that started the implementation of guidelines, and 3) how often different types of interventions were given to patients.

Materials and methods
Data was collected from the Danish Palliative Care Database on adult cancer patients starting palliative care between September 2017 and June 2019 who completed the EORTC QLQ-C15-PAL-questionnaire.

Results
During the improvement project, 11,330 (62%) patients admitted to palliative care completed the EORTC QLQ-C15-PAL-questionnaire. Across the project, pain, dyspnea, constipation and depression guidelines were followed by clinicians in 60%, 54%, 56% and 32% of the cases where patients reported severe symptoms, respectively. The time to implementation (i.e. first patients treated according to guideline) varied between services and guidelines; after implementation, proportions were roughly constant over time reaching between 54-86% (lowest for depression), with a tendency to decrease during the last part of the project. Pain and constipation were most often treated pharmacologically (66-72%), whereas dyspnea and depression were most often treated non-pharmacologically (61%).

Conclusions
Implementing clinical guidelines was more successful for physical symptoms than for depression. The project generated national data on the types of interventions used, which may be used to understand differences in care and outcomes.

Flash Talks

XII: The diagnostic follow-up procedures after a false-positive mammography screening reduces breast cancer risk sufficiently: a register-based study

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Abstract
Background
Women with one or more false-positive mammograms have a two to nine-fold higher risk of getting breast cancer. However, it is unknown whether the subsequent risk of breast cancer depends on the diagnostic follow-up performed after a falsepositive mammogram.

Aim
To investigate whether the subsequent risk of breast cancer depends on the diagnostic follow-up performed after a falsepositive mammogram.

Methods
44,265 women registered with a false-positive mammograms were included and categorized into four groups depending on the diagnostic work-up provided: 1) no follow-up; 2) follow-up included all three elements, i.e. ultra sound, additional mammography screening and biopsy; 3) follow-up lacking only biopsy 4) follow-up lacking either ultrasound and/or additional mammography.
Binomial and a Cox regression models, adjusting for age, were used to compare the risk of interval cancer (IC) and subsequent risk of breast cancer (TC). Of 44,265 women, 37,964 participated in a second MS and were used in a binomial regression model to compare the risk of having a screen-detected cancer (SDC).

Results
Follow-up lacking one or more elements (groups 1, 3 and 4) had a significant lower risk of IC than follow-up including all three elements; RR 0.45, 0.21, 0.36 respectively. The risk of getting a SDC at next screening did not vary significantly between the follow-up groups. The risk of getting a TC in the entire follow-up period was significantly lower when receiving follow-up lacking one or two element; HR 0.69-0.76.

Conclusion
The similar or lower risk of interval cancer, screen-detected cancer and subsequent breast cancer in groups that lacked one or more of the three elements of the diagnostic follow-up suggest that these diagnostic follow-ups did not lead to more missed cancers. The increased subsequent risk of breast cancer among women with a previous false positive result can therefore not be explained by missing elements in the diagnostic follow-up.

Clinical epidemiology and database research:

Poster #1-15

Clinical epidemiology and database research

#1: Benefit of adjuvant chemotherapy and trastuzumab in patients with HER2-positive, node-negative breast cancer ≤ 10 mm (T1abN0); a population-based study

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Abstract
Introduction
The aim of this study was to evaluate the effect of adjuvant chemotherapy and trastuzumab on invasive disease-free (iDFS) and overall survival (OS) in patients with human epidermal growth factor receptor 2 (HER2) positive, T1abN0 breast cancer.

Materials and methods
In the Danish Breast Cancer Group database, patients with HER2-positive, T1abN0 breast cancer diagnosed between 2007-2016 were identified. A Cox proportional hazards analysis was performed to analyze the association between adjuvant chemotherapy and trastuzumab and iDFS and OS.

Results
A total of 605 patients were included in the analyses, 465 patients received chemotherapy and trastuzumab and 140 patients did not. Treatment with chemotherapy and trastuzumab did not improve iDFS or OS significantly compared to no chemotherapy/trastuzumab when adjusting for age, malignancy grade, tumor size group (T1a: ≤ 5 mm, T1b: > 5 mm), radiotherapy, menopausal status, estrogen receptor (ER) status, endocrine treatment and histological subtype, 5-year iDFS was 92.3% vs. 89.9%, Hazard ratio (HR) 1.01 (95% CI 0.53-1.93, p = 0.98), and 5-year OS was 97.4% vs. 94.3%, HR 0.58 (95% CI 0.29-1.18, p = 0.13). In crude subgroup analyses, significant OS benefits were found in patients with T1b, but not in patients with T1a tumors. The largest absolute treatment benefits were found in patients with T1b and ER-negative tumors, whereas the treatment effects in patients with T1a and ER-positive tumors were very limited.

Conclusion
Adjuvant chemotherapy and trastuzumab did not improve OS or iDFS significantly in patients with HER2-positive, T1abN0 breast cancer. In subgroup analyses, patients with T1b and ER-negative tumors had the largest benefit from adjuvant chemotherapy and trastuzumab, whereas the effect was very limited in patients with T1a and ER-positive tumors.

Clinical epidemiology and database research

#2: The impact of diabetes associated risk factors on survival among individuals with type 2 diabetes and breast -, lung-, colorectal- or prostate cancer

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Abstract
Background and aims
Premature death in diabetes is no longer caused by cardiovascular disease to the same extent as before, but increasingly by cancer. The objectives of this study were to estimate the excess mortality, when individuals with type 2 diabetes (T2DM) were diagnosed with the most common cancer diagnosis (breast-, lung-, prostate- and colorectal cancer), and to examine how mortality risk was associated with modifiable diabetes-related risk factors such as HbA1c, cholesterol, LDL cholesterol, hypertension, BMI, smoking and physical activity.

Materials and methods
This longitudinal nationwide cohort study included individuals with T2DM registered in the Swedish National Diabetes Register any time between 1998 -2019. Each individual was followed and classified according to their time-updated cancer status and the main outcome was all-cause mortality. Poisson models were used to estimate the mortality as a function of the timeupdated risk-factor, adjusted for sex, age, diabetes duration, marital status, country of birth, and yearly income.

Results
We included 655,344 individuals with T2DM and during 4,787,324 person-years of follow-up 179,627 individuals died. Overall, the all-cause mortality rate ratio (MRR) was 2.89 [95% confidence interval (CI): 2.85-2.92] for those diagnosed with cancer when compared to those without cancer. The most significant risk factors associated to mortality among individuals with T2DM and a diagnosis of cancer were low physical activity, 1.59 (1.57-1.61) and smoking, 2.15 (2.08-2.22), whereas HbA1c, cholesterol, LDL cholesterol, hypertension, and BMI had only weak associations with survival.

Conclusion
In a future with more patients with T2DM and a cancer diagnosis, these results suggest that smoking and physical activity may be the two most salient risk factors for mortality in people with type 2 diabetes.

Clinical epidemiology and database research

#3: Prognostic significance of thrombocytosis in lung cancer. A register study of 7908 Danish lung cancer patients

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Abstract
Introduction
Thrombocytosis is a common observation in cancer patients and has been associated with a poor prognosis in a wide range of cancer types. However, in lung cancer, the results have been conflicting. Therefore, based on national Danish registries, we evaluated the prognostic value of thrombocytosis in a large group of lung cancer patients.

Materials and Methods
All lung cancer patients diagnosed in Region Midt from January 2009 to June 2018 were included in the study. Data from the Danish Lung Cancer Registry were combined with data from the clinical laboratory information system on pretreatment thrombocyte count. A thrombocyte count >400 or >350 were considered as thrombocytosis for men and women, respectively. The prognostic value of thrombocytosis was assessed by the Cox proportional hazard model, and C-statistics were conducted to investigate if it added additional prognostic value to existing prognostic markers.

Results
In total, 6758 patients with non-small cell lung cancer (NSCLC) and 1150 patients with small cell lung cancer (SCLC) were included. Thrombocytosis was significantly associated with decreased overall survival in NSCLC patients (adjusted hazard ratio (HR)=1.21 (95% confidence interval (CI): 1.13-1.31), but not in SCLC patients (HR=1.03 (95% CI: 0.86-1.22). In NSCLC patients, Cstatistics showed that the prognostic model improved by the addition of thrombocyte value and this improvement was statistically significant ($p<0.0001$).

Conclusion
Thrombocytosis is an independent negative prognostic factor in NSCLC patients but not in SCLC patients.

Clinical epidemiology and database research

#4: RISK OF CANCER IN ADULT PATIENTS WITH PRIMARY IMMUNE THROMBOCYTOPENIA – A POPULATION-BASED COHORT STUDY

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Abstract
Introduction
Immune thrombocytopenia (ITP) is a benign autoimmune blood disorder characterized by low platelet count. An ITP diagnosis requires exclusion of other causes of thrombocytopenia such as malignant bone marrow disorders that may first emerge years later. In addition, immunosuppressive drugs which are cornerstone in ITP management, increases risk of cancer. Since early detection is crucial for prognosis, knowledge on cancer risk in patients with ITP may impact clinical follow-up. We therefore investigated occurrence of cancers in patients with primary ITP compared with the general population, hypothesizing an elevated risk in patients.

Material and methods
We identified incident patients with primary ITP ≥18 years in the nationwide Danish National Patient Registry during 1980-2016 by using the first registration of the designated codes 287.10 (ICD-8) or D.69.3 (ICD-10). We excluded patients with prevalent ITP, secondary ITP, or prevalent cancers. Patients were age-sex matched with up to 40 comparators from the general population. Date of the first ITP registration marked start date of follow-up, and comparators were assigned the same start date. Incident cancers were identified using designated cancer registrations. Individuals were followed from start date until the first of the following: cancer, death, emigration, or end of study. We estimated cumulative incidences, hazard and subhazard ratios for cancer.

Results
We identified 4,768 patients and 189,662 comparators. 5-year risks were elevated for solid cancer with a cause-specific hazard ratio of 1.29 [95 % CI 1.14-1.47], and 7.42 [[95 % CI 6.07-9.06] for hematological cancer. Cumulative incidences showed that risks diminished over time.

Conclusions
Risk of cancer in patients with primary ITP is elevated, particularly the risk of hematological cancer and in the years following ITP. Clinical focus and follow-up should be directed upon this. Details on cancer types will be presented with the abstract.

Clinical epidemiology and database research

#5: Improved quality of care of colorectal cancer during the Covid-19 pandemic?

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Abstract
Introduction
It is unknown if the social disparity or the quality of care delivered to CRC patients changed during the Covid-19 pandemic. We examined social disparity, quality of care delivered, and time from operation to oncological treatment of CRC during the Covid-19 pandemic in Denmark.

Materials and methods
Data on 12,877 registered CRC cases in the Danish Colorectal Cancer Database (DCCG) 2018-2020 were linked with socio-economic characteristics. We used a glm model with robust standard error to estimate prevalence ratios (PR) for categorical variables and a quantile regression to estimate changes (in days) in the time to oncological treatment; all compared to before the pandemic.

Results
Patients in 2020 were older (median age: 73 vs 72), and less likely to be non-western immigrants (PR=0.92(0.86;0.98)). During the lock-down period, more patients with the highest income were diagnosed (PR=1.32(1.09;.161)).

Fewer patients in 2020 were diagnosed by screening (PR=0.80(0.74;0.86)) and operated acutely (PR=0.82(0.70;0.95)). More patients in 2020 were operated with a curative aim (PR=1.02(1.01;1.03)) or discussed at an MDT (PR=1.07(1.06;1.09)). These findings were similar over the course of the pandemic.

In 2020, fewer patients had more than 28 days in time to oncological treatment than in 2019 (PR=0.71(0.63;0.80)); with the fewest patients during the re-opening period (PR=0.70(0.60;0.81)). The median time to oncological treatment decreased by an average of 1(-2;6) to 3(1;6) days during the covid-19 pandemic; with a larger decrease among the 20% who had the longest time to oncological treatment.

Conclusion
The consequences of the Covid-19 pandemic in Denmark on CRC diagnosis and treatment were mainly positive. The quality of care improved in terms of more MDTs used, fewer acute operations, more curative aimed treatments, and shorter time to oncological treatment. Small increases in socio-economic disparity were observed during the period of the pandemic.

Clinical epidemiology and database research

#6: Identification of socially vulnerable cancer patients - development of a register-based index (rSVI)

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Abstract
Background
Social vulnerability is a complex construct which is beyond relying on single measures. Socially vulnerable cancer patients may be particularly interesting to identify and support in order to reduce social disparities in the cancer trajectory. A composite measure capturing the patient's overall circumstances is needed. This study presents the development of a social vulnerability index (rSVI) for cancer patients based on administrative data from population-based registers.

Material and methods
All 44,187 patients, who were diagnosed with cancer during 2013-2018 and died from cancer within five years in the period 2015-2018, were identified and divided into four subcohorts according to survival; index cohort (n=3,044 surviving 3-5 years), cohort 1 (n=27,170 surviving <1 year), cohort 2 (n=9,450 surviving 1-2 years), and cohort 3 (n=4,523 surviving 2-3 years). Variables from ten registries were linked to each individual and weighted to construct the rSVI using the index-cohort. A cut-off point on the rSVI was applied to separate the most socially vulnerable fifth of the index cohort from the remainder. The rSVI was subsequently tested on the three other cohorts for validation.

Results
The rSVI included weighted values for marital status, ethnicity, education, income, unemployment, psychiatric comorbidity, and somatic comorbidity. From a possible maximum sum score of 14 points, patients scoring ≥5 were categorized as vulnerable. Single social measures appeared to be insufficient to identify socially vulnerable patients. Survival time, drug and alcohol abuse treatment, imprisonment and frailty were found associated with the rSVI, suggesting validity of the index.

Conclusion
The rSVI provides a tool for a quantitative identification of socially vulnerable cancer patients using administrative data from population-based registries. Further investigation of socially vulnerable cancer patients' need for and use of health care services is needed.

Clinical epidemiology and database research

#7: Healthcare utilization and comorbidity in chronic lymphocytic leukemia

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Abstract
Introduction
The median age at the time of chronic lymphocytic leukemia (CLL) diagnosis is high and therefore comorbid conditions are highly common. The purpose of this study was to investigate the impact of co-existing conditions on healthcare utilization (HCU) in patients with CLL.

Materials and Methods
Data from Danish nation-wide registers were used to study HCU in terms of hospital admissions, in-hospital bed days, out-patient visits, emergency room visits, and prescription drugs during the year prior to and the year post CLL diagnosis. We included all patients diagnosed with CLL between 1997-2018, stratifying on number of comorbidities and presence of specific comorbidities. Odds ratios with 95% confidence intervals, adjusted for age, sex, and calendar year, were calculated using multivariable logistic regression analyses.

Results
In total, 9 170 patients with CLL were included in the study with a median age of 71 years and comorbidity was present in 35% of patients. HCU increase upon CLL diagnosis both for patients with and without comorbidities (OR range: 1.25-17 8.78). In the year after CLL diagnosis, 39% of patients were hospitalized, 16% visited an emergency room, 88% visited an out-patient clinic, and 93% received prescription drugs. During the year after CLL diagnosis, the number of comorbidities was associated with all types of HCU (OR range: 1.28-7.59), except for contacts to hematological departments. Individual comorbidities, including diabetes, chronic pulmonary disease, congestive heart failure or MI, or cerebrovascular disease, were also associated with higher HCU.

Conclusions
Our results suggest that the CLL diagnosis may unveil incipient diseases and aggravate comorbidities and thereby have considerably wider health implications than those directly related to CLL. These findings may be used by clinicians and decisions makers planning future multidisciplinary care for patients with cancer.

Clinical epidemiology and database research

#8: Impact of surgery and chemotherapy timing on outcomes in older versus younger epithelial ovarian cancer patients: a nationwide Danish cohort study

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Abstract
Introduction
Epithelial ovarian cancer (EOC) is the most lethal gynecological cancer for which long-term survival is conditioned by surgery and chemotherapy. Striking a balance between this comprehensive treatment combination and the patient population, with a substantial number of older women, poses a continuous challenge. Older patients with EOC repeatedly demonstrate poor survival compared to younger. Yet, age itself cannot explain the survival gap. We aimed to explore differences between older and younger patients regarding surgical complexity, chemotherapy management, and treatment delays in Denmark.

Materials and Methods
We included a nationwide cohort of patients diagnosed with EOC from 2013 to 2018. We described surgical complexity and outcomes, the extent of chemotherapy and treatment delays stratified by age (< 70 and ≥ 70 years), and surgical modality (primary, interval, or no debulking surgery).

Results
We included 2,946 patients in total. For patients with advanced-stage disease, 52 % of the older patients versus 25 % of the younger patients did not undergo primary debulking surgery (PDS) or interval debulking surgery (IDS). In patients undergoing PDS or IDS patients, older patients had less extensive surgery and were more likely to have residual disease after surgery than younger patients. Furthermore, chemotherapy was given less frequently to older patients. Older patients underwent PDS two days later than younger. Regarding treatment delays, we found no differences across age cohorts. Regardless of curatively-intended treatment, twoyear cancer-specific survival differed significantly between age cohorts.

Conclusion
Our study demonstrates that older patients receive less active surgical and oncological treatment than younger patients, resulting in lower cancer-specific survival. Treatment delays are not more common in older patients than in younger patients.

Clinical epidemiology and database research

#9: Treatment failure after radiotherapy for anal cancer

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Abstract
Background
Anal cancer (AC) is primarily treated with radiotherapy (RT). Information on the pattern of failure is important when optimizing treatment strategies. The aim of this study was to describe location of treatment failures and outcome after RT for AC.

Methods
A single centre, retrospective study was conducted, including patients with histopathological proven squamous cell carcinoma of the anus diagnosed between 1998 and 2018 and treated with RT with curative intention. Data was collected from medical records and included patient-, disease-, and treatment characteristics, and outcome data. Locoregional failure (LRF) was defined as failure within the pelvis and distant failure (DF) as failure outside the pelvis.

Results
In total 420 patients treated with curative RT were identified. Median follow-up (FU) time was 6.1 years (range 0.05-23.6). Overall survival for all stages at 3- and 5 years was 84.0% and 75.5%, respectively and disease-free survival was 73.2% and 69.9% at 3 and 5 years. 85.9% (n=361) achieved complete response (CR) after RT whereas 13.8% (n=58) was diagnosed with persistent disease, of whom 94.8% had salvage surgery performed. Of patients with CR after RT 19.1% (n=69) experienced treatment failure during FU. As first site of recurrence 13.0% had LRF (n=47), 5.0% had DF (n=18), and 1.1% had LRF + DF (n=4). When combining both persistent disease and later recurrence 30.2% experienced treatment failure. DF as first site of failure was located to either lung (n=11), liver (n=7) distant LN (n=8), bone (n=1), brain (n=1) or other (n=2) with 8 patients having failure to more than one site. Looking at subsequent failures DF was seen in further 14 cases with a total DF rate of 8.6%.

Conclusion
The majority of recurrences were located within the standard irradiated area. Consequently, it is highly relevant to investigate the exact anatomical location and its relation to specific treatment dose. A dose-mapping study is therefore ongoing.

Clinical epidemiology and database research

#10: Treatment of Large Cell Neuroendocrine Lung Cancer (LCNEC) with monotherapy temozolomide

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Abstract
Introduction
Large Cell Neuroendocrine Lung Cancer (LCNEC) is a rare type of lung cancer, classified as a neuroendocrine neoplasm. Only sparse data are available on the treatment effect of chemotherapy, and almost no data on the effect of temozolomide (TMZ) treatment.
Here we describe the clinicopathologic patient characteristics and the outcomes of TMZ treatment in terms of progression-free survival (PFS), overall survival (OS), disease control rate (DCR), and objective response rate (ORR), at the Copenhagen NET Center of excellence.

Materials and Methods
Baseline and treatment characteristics, next generation sequencing (NGS) analyses, and follow-up information of consecutive patients were obtained retrospectively from the institutional database. Estimates of OS and PFS were determined using the Kaplan Meier method and compared across prognostic factors using log-rank analyses.

Results
Thirty-seven inoperable LCNEC patients with advanced disease treated with TMZ from 2016 to 2020 were included. Median OS was 5.5 months and median PFS was 2.5 months. Performance status or line of treatment had no impact on OS or PFS. Ten patients (27%) obtained disease control (DC) and of these, two patients had objective response (OR). The duration of DC was 8.6 months and OR was 7.9 months, both of which were statistically significant improvements compared to progressors. Neither Ki67, performance status, line of treatment, nor NGS-status had impact on efficacy.

Conclusions
This study is the largest analysis of treatment outcomes of TMZ in LCNEC patients. One-fourth of the patients obtained DC of a median of 8.6 months duration. No apparent predictive factors for DC on TMZ could be identified from the dataset. Further prospective randomized trials are warranted to determine the most beneficial treatment of advanced LCNEC.

Clinical epidemiology and database research

#11: Long-term outcome in Danish real-life patients with advanced non-small cell lung cancer (NSCLC) receiving immune checkpoint inhibitors

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Abstract
Introduction
Immune-checkpoint inhibitors (ICI) are increasingly used as standard therapy in real-life clinical settings, based on data from randomized controlled trials (RCTs). However, real-life patients with advanced NSCLC differ clinically from RCT populations. Currently, only sparse data on long-term outcome for real-life patients with advanced NSCLC treated with ICI exists.

Materials and Methods
Data from four Danish centers including 729 patients with advanced NSCLC receiving monotherapy with ICI was gathered through 2015-18 (retrospective data (n=566)) and 2018-21 (prospective data (n=163)) with data-cutoff at April 1st 2022. Baseline characteristics of age, sex, PD-L1, comorbidity, performance status, body mass index, organ metastases, known autoimmunity, and khorana score were gathered. Kaplan-Meier estimates and log-rank test were used for survival analyses and cox regression for hazard ratios.

Results
Median follow-up time was 48.7 months (IQR 37.2-54.3). For 9% of patients a full two year ICI course was completed. Median overall survival (OS) in first line was 20.4 months (IQR 8.5-45.0) compared to 11.4 months (IQR 4.6-27.1) in ≥ 2nd line (HR 1.48, 95%CI 1.25- 1.75). Estimated 3, 4 and 5 year OS was 30%, 23% and 13% in 1st line compared to 17%, 13% and 11% in ≥ 2nd line, respectively.
Factors, which were statistically significant in favor of longer OS in the multivariate analysis were female sex, age < 75 years, PD-L1 ≥50% , performance status <2, no liver- and bone metastases, and khorana score <2.

Conclusions
Compared to RCTs, long-term OS and PFS rates seem lower in real-life patients, which may in part be attributable to more patients over 75 years and/or more patients with PS >1. A promising flattening of both the OS and PFS curve indicate that also a subset of real-life patients obtain long-term remission. PD-L1 <50%, a baseline khorana score ≥2, male sex, liver- and bone metastases were associated with impaired survival.

Clinical epidemiology and database research

#12: The national cross-sectoral cost implications of better end of life cancer care quality: Evidence from Danish registries

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Abstract
Introduction
Despite continued developments in cancer targeted drug treatment options, there is increasing consensus that high quality cancer care at the end of life (EOL) is to reduce medical treatment close to death and for patients to die in their own home. While higher quality care is associated with lower costs of cancer targeted treatment in secondary care, the implications for total costs of care across sectors are unclear. Using Danish registers, we aim to investigate determinants of variation in costs and quality of care cancer care at the EOL.

Methods
Data includes 95,524 adults (>18) who died from cancer from 2011 to 2018. We collect information on socio-demographics, diagnosis, use and costs of primary care, hospital care, prescription medicine, and home care. Costs are calculated as weekly means to allow for different disease trajectories. Costs are regressed using Generalized Linear Models. Quality indicators are regressed separately as binary outcomes using logit models. We use coarsened exact matching to find comparable patient groups receiving different levels of quality and estimate cost differences.

Results
Preliminary results suggests that average total costs per patient the last year of life, is 299,352.00DKK. The secondary sector contributes to 85% of these costs. 20% of patients receiving cancer targeted treatment the last year of life, receive treatment within the last 30 days of life. For patients treated 30 days before death total costs increase by 25% compared with patients that are not treated the last 30 days of life. In total 31% died at hospital and 16% died at hospice. For patients receiving treatment the last 30 days of life the incidence of hospital deaths doubles whereas deaths at hospice decrease to 11%.

Conclusions
The results of this study highlight that poorer quality EOL care, namely treatment near death increases the likelihood of dying in hospital, which is also considered poor quality of care at EOL.

Clinical epidemiology and database research

#13: Parametrization of artery delineation and nationwide implementation in the DBCG RT Nation cohort

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Abstract
Introduction
With automation of delineation in radiotherapy making its entry in clinical routine, it is desirable to have a framework for quality assurance (QA) of delineation of small organs of limited visibility. In this study we develop a parameterization of left anterior descending coronary artery (LADCA) delineation.

Materials and Methods
We included organ delineations from 4598 danish high-risk breast cancer patients treated with adjuvant radiotherapy across the nation during 2008-2017. A national delineation guideline was published in 2013. LADCA was parameterized using metrics describing volume, cranial-caudal (CC) and cumulative length, width, anterior-posterior and lateral-medial consistency between slices, missing organ slices and number of patients with delineations. Results were stratified by year and treating center. Significance was tested with the Mann-Whitney U-test.

Results
The method was successfully used in all patients included in the Danish Breast Cancer Group (DBCG) RT Nation cohort. In the period around the implementation of national delineation guidelines (2012-2014), the differences between the centers were smallest. For mean width there was a significant difference between centers in the periods 2008-2012 and 2014-2017 ($p<0.001$). For CC length, no significant differences were found between center 2 and 3 (2011-2016), however center 4 differed significantly in the periods 2010- 2011 and 2015-2017 ($p<0.001$).

Conclusions
We have developed a method for parametrization of delineations of LADCA. Our results showed significant differences in delineations of LADCA among centers and need for regularly QA regarding delineations. This method is generalizable for other organs.

Clinical epidemiology and database research

#14: DAHANCA CUP: Et populationsbaseret fase-4 kohorte studie vedrørende ukendt primær tumor i hoved-hals området

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Abstract
Introduktion
Hos 2,9% af alle patienter med planocellulært karcinom i hoved-halsområdet finder man aldrig den primære tumor. Disse patienter har en eller flere lymfeknudemetastaser på halsen og diagnosticeres med "Ukendt primær tumor" (UPT). I Danmark gennemgår alle patienter med mistænkt UPT et standardiseret udredningsprogram. Lykkes det ikke at identificere en primær tumor, behandles patienten efter et standardiseret behandlingsprogram for UPT ud fra en fælles retningslinje udarbejdet af Den Danske Hoved-Hals Cancer Gruppe, DAHANCA. Såvel udrednings- som behandlingsstrategien varierer verden over. Det er helt unikt, at vi I Danmark har en fælles udrednings- og behandlingsretningslinje gældende i hele landet.

Formål
Formålet med nærværende studie er at evaluere udrednings- og behandlingsresultaterne på patienter med UPT behandlet efter de nationale DAHANCA retningslinjer fra 2013. Desuden at undersøge i hvor høj grad retningslinjerne følges.

Materiale og metoder
Prospektivt registrerede data fra DAHANCA-databasen blev indsamlet på alle patienter behandlet for UPT i Danmark i perioden 2014-2020.

Resultater
I alt er 287 patienter blev inkluderet, hvoraf 252 blev behandlet med kurativ intention. Behandlingsplanlægningen fulgte DAHANCA's retningslinjer hos 256 (89%) af patienterne, og 280 (98%) af patienterne blev drøftet på MDT konference. Hos kurativt behandlede modtog 95 (38%) patienter radioterapi, 100 (40%) modtog kemoradioterapi, imens 57 (23%) patienter udelukkende blev behandlet med kirurgisk fjernelse af lymfeknuderne. Den 3-årige samlede overlevelse (OS) for hele population var 69,7 % (95 % CI: 63,5, 75,0). Til sammenligning var den tilsvarende 5-års overlevelse blot 36% ved den seneste landsopgørelse i 2000.

Konklusion
Vores studie viser, at retningslinjerne i høj grad følges, og at prognosen for UPT-patienter synes fordoblet over tid og sammenlignelig med planocellulær hoved-hals cancer med kendt primært udgangspunkt.

Clinical epidemiology and database research

#15: Geographical distribution of multiple myeloma in Denmark: A national cross-sectional study

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Abstract
Introduction
The etiology of multiple myeloma (MM) is unknown but various environmental exposures are suspected as risk factors. We present a standardized distribution of MM in Denmark at a municipal level to investigate variation that could be explained by environmental exposures.

Materials and Methods
Patients diagnosed with MM between 2005 and 2020 were identified from the Danish National Multiple Myeloma Registry and linked to the Danish Civil Registration System to obtain the residence six months prior to diagnosis. The distribution of MM across the 98 Danish municipalities was presented as age- and sex-standardized incidence rates (SIRs) per 100,000 person-years. Control limits assuming only stochastic variation were set at 99% and rates above the limit were considered significantly higher than the national incidence. Analysis was also performed on a subcohort, excluding smoldering multiple myeloma (SMM) to minimize potential bias due to different diagnostic practices.

Results
The study included 6,102 MM patients. Of these were 1,176 classified as SMM. The overall national incidence of MM was 7.2 per 100,000 person-years. Lowest SIRs were mainly located in east Denmark and highest SIRs in south-middle Denmark. Five neighboring municipalities in southern Denmark had significantly higher SIRs compared to the national incidence. When SMM were excluded from the cohort, one municipality (Vejen) had significantly higher SIR.

Conclusions
This study provides the first analysis of the geographical distribution of MM patients in Denmark. Our results revealed a heterogeneous pattern of MM in Denmark which could support the idea that environmental factors affect the risk of getting MM. There is a need for prevention and this study offers a foundation for further investigation and guides future studies to clarify the etiology behind MM.

Clinical Trials:

Poster #16-47

Clinical trials

#16: Optimizing preoperativ mapping for lymphovenous anastomosis in breast cancer related lymphedema using ultra high-frequency ultrasound and ICG lymphangiography: A study protocol

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Abstract
Introduction
Breast cancer is the most common cancer diagnosis in women. With its high survival rate, the number living with long-term sequela is significant. More than 1 in 5 develop breast cancer related lymphedema which results in arm-swelling, loss of function and a reduced quality of life and negative body perception. Lymphovenous anastomosis (LVA) surgery seems promising in selected patients. The technique aims to re-establish the lymphatic flow, utilizing the patient's own lymphatic and venous vessels. Literature emphasizes the importance of targeted surgery identifying the right vessels for anastomosis. This study utilizes combined use of indocyanine green (ICG) lymphography and ultra high frequency ultrasound (UHFUS) to test if we can correctly identify the lymphatic vessels and venoles in close proximity to each other prior to LVA surgery.

Materials & Method
The trial is a pilot study including 10 patients clinically suitable for LVA with breast cancer related pitting-lymphedema in the upper extremities. ICG lymphography is used for real-time visualization of the lymphatic vessels, which are then marked by a permanent marker. Subsequently UHFUS is used to identify venoles in close proximity of the lymphatics for targeted surgery. The number of preoperatively mapped lymphatic- and venous-vessels are compared to the number identified during surgery and used for as our primary outcome. Secondary outcome measures changes of arm volume, lymphatic pattern by ICG lymphography, health-related quality of life, lymphatic function and body composition are registered prior to- and at follow up three months after surgery.

Results
The study period is from the 1st of February 2022 till the 31st of January 2024. Preliminary data and an illustration of the technique will be presented.

Conclusion
We hope the results of this pilot study will contribute to knowledge for targeted individualized treatment of breast cancer related lymphedema.

Clinical trials

#17: DBCG Skagen 1: Phase III randomized trial of hypo- vs standard fractionated RT in 2879 node-positive breast cancer patients

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Abstract
Purpose
Adjuvant radiation therapy (RT) for high-risk breast cancer (BC) using 50Gy/25fr has been Danish Breast Cancer Group (DBCG) standard since 1982. Recently, moderately hypofractionated BC RT based on 40Gy/15fr has been increasingly used, however, not for loco-regional therapy due to concern over a higher risk of morbidity. The non-inferiority DBCG Skagen trial 1 had the hypothesis that 40Gy/15fr did not result in more arm lymphedema than 50Gy/25fr 3 years after RT.

Material/Methods
2879 pts operated for high-risk BC were enrolled during 2015-21 and randomized 50Gy/25fr vs. 40Gy/15fr. All tumour-bed boosts were simultaneous integrated (SIB). The primary endpoint was ipsilateral arm lymphedema at 3 years. Accrual was to stop, when 1012 pts had 3-yr morbidity estimates reported. ClinicalTrials.gov NCT02384733.

Results
The 50Gy group comprised 1442 pts (50%) and the 40Gy group 1437 pts (50%). Median age was 58 years (range 20-86 years). Mastectomy was used in 1372 pts (48%), 1507 pts (52%) had lumpectomy, and a SIB was used in 16%.
At median follow-up of 2.0 years (IQR 0.0-3.1) the 3-yr rates of ipsilateral arm lymphedema were 11.7% in the whole group, whilst in the 50Gy vs 40Gy group it was 11.6% versus 11.8%, absolute difference 0.1%, p=0.96. Range of shoulder motion was not impaired (<20% different) in 97.5%, the frequencies being 96.3% (50Gy) versus 98.7% (40Gy), no difference. Breast induration in postlumpectomy pts was 26.0% (22.9% (50Gy) vs 29.1% (40Gy), p=0.11. Overall, the 3-year risk of loco-regional recurrence was 1.8% (1.2-2.7) (50Gy) and 1.8% (1.1-2.7) (40Gy), risk of distant failure was 5.6%

(4.3-7.1) (50Gy) and 6.9% (5.5-8.6) (40Gy), and risk of death was 3.7% (2.6-5.0) (50Gy) and 4.8% (3.6-6.2) (40Gy).

Conclusion
Hypofractionated loco-regional BC irradiation of high-risk BC does not result in more arm lymphedema compared to standard fractionated therapy. Hypofractionated RT did not influence the risk of distant recurrence or death.

Clinical trials

#18: The DBCG RT Proton trial: Adjuvant breast proton radiation therapy for early breast cancer patients, a clinically controlled randomised phase III trial

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Abstract
Introduction
The prognosis of breast cancer (BC) has improved over decades, thus long-term morbidities increasingly play a role. Serious late effects (LE) from radiation therapy (RT) are second cancer and heart disease. RT improves the prognosis, but must be balanced with risk of RT induced LE. Proton therapy (PT) causes lower dose to organs at risk. The hypotheses of this phase III randomised trial are that compared to photon RT, 1) the risk of cardiac disease is lower using PT, 2) the risk of second cancer is reduced using PT, and 3) the risk of distant failure and death from BC is reduced by using PT.

Material/Methods
The selection criteria for the trial were based on a planning study on 180 RT plans collected from 18 hospitals. Using DBCG criteria for optimal dose coverage of targets may lead to a high dose to the heart/lung. If the mean heart dose (MHD) is ≥4Gy and/or the V20 lung is ≥37% the patient is eligible. The primary endpoint is heart disease 10 years post RT, risk of lung cancer, recurrence and loco-regional morbidities. The power calculation is based on a 5-yr freedom from heart disease of 94.2% for a nonirradiated woman 60 years of age, 93.7% for a PT patient with MHD 0.5 Gy, and 89.8% for at photon treated patient with MHD 4 Gy. The number of patients needed in the trial is 1502 patients. The follow-up evaluations are in harmony with other DBCG and international PT trials. A subset of the patients will have extensive cardiac evaluations including heart-CT, echocardiography and PET scans.

Results
The trial was initiated June 2020 at AUH and 87 patients have been included. Due to the COVID-19 pandemic, initiation at the remaining Danish centers was delayed. All Danish centers are expected to start inclusion early 2022.

Conclusion
PT for BC is introduced as a new treatment option for selected patients with high RT dose to heart and/or lung. PT is expected to reduce the risk of serious RT associated late effects and improve disease control.

Clinical trials

#19: DBCG RT Natural trial: Partial versus no breast radiation therapy for women ≥ 60 years operated with breast conservation for a relatively low risk early breast cancer, a clinically controlled randomized trial

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Abstract
Introduction
Since April 2016 partial breast irradiation (PBI) has been DBCG (Danish Breast Cancer Group) standard for selected low risk breast cancer patients operated with breast conservation. This is based on results from the UK IMPORT LOW trial and from the DBCG PBI trial. The 5-year risk of local recurrence after PBI is 0.5% compared with a 2% risk of contralateral new breast cancer. Data from randomized trials on gain from radiation therapy (RT) indicates a risk reduction of local recurrence from RT by 2/3. Thus, omission of PBI may increase the 5-year risk of local recurrence to 1.5-2%, i.e. to the level of a contralateral new primary. In the DBCG RT Natural trial the DBCG RT Committee tests if omission of PBI in selected patients is possible without causing an unacceptable local recurrence rate.

Material/Methods
Patients ≥60 years operated with breast conservation for a low-risk breast cancer (non-lobular, pT1, pN0, ER+, grade 1-2, HER2-, margin ≥2mm) are randomized ± PBI, where PBI is based on 3DCRT 40 Gy/15 fr. Strata are institution and endocrine therapy. The study will randomize 926 patients 1:1. The primary endpoint is 5-year invasive local recurrence. Secondary endpoints are local morbidity, fear of cancer recurrence and pattern of recurrences. NCT 03646955.

Results
Accrual was initiated Oct 2018, and as of April 2022, 523 patients were included, 364 randomized and 159 opted for no PBI. The trial is active in RT departments in Denmark (n=7), Norway (n=6), Sweden (n=3), and Chile (n=1).

Conclusion
The DBCG RT Committee constantly aims to optimize the indication for adjuvant breast radiation therapy to ensure a balance between gain and harm. The DBCG RT Natural trial is part of that strategy.

Clinical trials

#20: Forlænget tromboseprofylakse efter operation for esophaguscancer

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Abstract
Introduktion
Trombose er den næst hyppigste dødsårsag for patienter med cancer. Risikoen for trombose afhænger blandt andet af cancertypen, og øvre gastrointestinale cancere anses for særligt trombogene. Tromboserisikoen øges yderligere, når patienten skal undergå operation. På trods af dette undersøger kun meget få studier den peri- og postoperative koagulationsprofil hos patienter, som skal opereres for esophaguscancer. Patienterne behandles aktuelt i 10 dage med 5000 IE lavmolekylært heparin dagligt. Til sammenligning anbefales patienter med ventrikelcancer behandling i fire uger.
Vi inkluderer aktuelt patienter til et randomiseret, kontrolleret studie, der sammenligner 30 dages tromboseprofylakse med Fragmin efter intenderet kurativ operation for esophaguscancer med standard tromboseprofylakse på 10 dage.
Formålet med studiet er at undersøge om forlænget profylakse nedsætter tromboserisikoen efter operation for esophaguscancer.

Materialer & metoder
Vi planlægger at inkludere i alt 100 patienter. Der tages blodprøver før og under operationen, på første postoperative dag og 30 dage efter operationen. Der analyseres trombocytaggregation, dynamisk fuldblodskoagulation med rotatorisk tromboelastometri (ROTEM), protrombin fragment F1+2, trombingeneration, plasminogen activator inhibitor 1 (PAI-1), tissue plasminogen activator (tPa) og in-house dynamisk fibrinolyseassay.
Patienterne ultralydsskannes desuden for venøs tromboemboli i underekstremiteterne lige før og 30 dage efter operationen.

Resultater
Der er aktuelt inkluderet 30 patienter. Resultater afventes.

Konklusioner
Vi forventer, at resultaterne kan bidrage til en national behandlingsguideline for tromboseprofylakse.
Perspektivet er at forbedre mortalitet og morbiditet for patienter med esophaguscancer, der har undergået en intenderet kurativ operation.

Clinical trials

#21: Prospective Surveillance for Breast Cancer-Related Lymphedema: A multicenter randomized controlled trial

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Abstract
Introduction
Breast cancer-related lymphedema (BCRL) continues to be a major problem which negatively impacts survivors' mental and physical well-being. In Denmark, there is no streamlined approach for measurement and management of BCRL likely due to a paucity of evidence into effective, scalable and accessible surveillance programs. This trial will establish the efficacy of prospective surveillance and early intervention on the development of chronic BCRL.

Material and methods
This is a multicenter trial of patients at high-risk for BCRL comparing the outcomes of the prospective surveillance program (PS) vs usual care (UC). All patients booked for breast cancer surgery are screened for eligibility. Patients with axillary lymph node dissection (ALDN) are at high-risk for BCRL and randomized to PS or UC, while patients without ALND form a low risk cohort. All participants are assessed with bioimpedance spectrography and self-measured arm circumference (CIR) at pre-surgery and 24 months post-surgery. In addition, the PS group perform self-measured arm CIR at home every three months. When ≥6% arm volume increase or symptoms of BCRL is evident, PS participants are referred to lymphedema therapists and provided with at fitted compression garment. The primary outcome is prevalence of chronic BCRL at 24-months post-surgery.

Results
Recruitment is ongoing at the University Hospitals in Aarhus, Odense, Roskilde, Herlev and Rigshospitalet. Since January 2021, a total of 478 patients have been included. Of these, 67 and 68 are randomized to PS and UC, respectively.

Conclusion
Development and testing of evidence-based self-management programs is imperative to reduce the number of women who develop chronic BCRL. It has significant value to identify BCRL early and thereby potentially prevent the progression to avoid irreversible changes that require life-long management with the subsequent physical, emotional, and financial impact.

Clinical trials

#22: Surveillance with FDG PET/CT after Completion of Therapy for NSCLC: A Status Update on Inclusion in the SUPE_R Trial

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Abstract
Introduction
The SUPE_R trial is an ongoing clinical trial, designed to explore whether surveillance after curative treatment of non-small cell lung cancer (NSCLC) with 18F-FDG PET/CT and cell-free tumor DNA sequencing (ctDNA) can improve recurrence detection and increase the number of treatable relapses.

Materials and methods
Patients diagnosed with NSCLC who are candidates for curative therapy, are recruited prior to therapy to obtain a baseline blood sample for ctDNA analysis (part 1). After successful completion of curative treatment verified at the first post-treatment surveillance CT scan, patients are randomized to either continue standard surveillance or surveillance with FDG PET/CT replacing CT every 6 months, for two years or until recurrence (part 2).

Results
Patient enrollment started in 2018 and the inclusion goal of 750 randomized patients was met in November 2021. 923 patients were enrolled in part 1. 492 (53.3%) patients included in part 1 were not randomized for part 2. This was most frequently due to dropout before screening for part 2 (n = 203, 41.3%), refusal to participate in part 2 (n = 118, 12.8%), exclusion due to unmet inclusion criteria for part 2 (n = 97, 10.5%) or progressive disease (n = 62, 6.7%). 319 patients were included in part 2 without prior inclusion in part 1. The proportion of patients not randomized for part 2 was higher

for patients with advanced disease at diagnosis (stage III) compared to patients with localized disease (stage I-II, 64.7 vs 47.8%, $p < 0.001$), which is partially explained by a higher risk of death (6.3 vs 2.2%, $p = 0.008$) and disease progression (9.5 vs 5.5%, $p = 0.063$) in these patients.

Conclusion
Enrollment in the SUPE_R trial was recently completed after 3 years of patient recruitment. Half of patients included in part 1 were not randomized for part 2 and the proportion of patients not randomized was higher for patients with more advanced disease at diagnosis.

Clinical trials

#23: DAHANCA 27, a national prospective non-inferiority study of surgery versus radiotherapy for T1a glottic cancer

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Abstract
Introduction
The aim of this study was to evaluate whether treatment with transoral laser microsurgery (TLM) is non-inferior compared to accelerated radiotherapy (RT) in the treatment of T1aN0M0 glottic squamous cell carcinoma (SCC).

Material and Methods
Since 2003 the Danish national standard treatment for T1aN0M0 glottic SCC has been accelerated RT (66Gy. 2 Gy/fraction, 6 fractions/week). In 2012 cordectomy type I-III using TLM was introduced as an experimental treatment. The DAHANCA 27 trial was a comparative non-inferiority phase II study comparing two timely separated national patient cohorts. Patients treated with radical TLM from September 2012 to April 2016 were included in the TLM cohort, and patients treated with accelerated RT from January 2003 to august 2012 were included in the RT cohort. The primary endpoint was 5-year laryngectomy free survival (LFS).

Results
A total of 94 patients were included in the TLM cohort and 553 patients in the RT cohort. Ten (10.6%) and 38 (7.1 %) patients experienced failure in the TLM and RT group, respectively, hereof 2 (2.2%) and 16 (2.9%) lost tumor control within 5-years of follow up despite salvage attempts. Five-year LFS was 88.5 and 76.8 % ($p<0.001$) in the two groups and 5-year laryngectomy incidence was 1.0 and 4.6 % ($p=0.01$), both favoring TLM. No difference was observed in patient reported voice outcome between the two groups. Voices were significantly more breathy in the TLM cohort and more rough in the RT cohort, but despite statistical significance, the difference was to small to represent a clinically relevant difference.

Conclusion
Trans oral laser microsurgery was non-inferior in the treatment of T1a glottic scc compared to accelerated radiotherapy regarding laryngectomy free survival. No clinically relevant difference in voice outcome was observed between the two groups, but laryngeal preservation was significantly higher in the TLM group.

Clinical trials

#24: Danish Breast Cancer Group SKAGEN Trial 1: A report on annual trial participation

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Abstract
Introduction
Clinical trials need wide-ranging patient (pt) participation to gain adequate sample sizes and externally applicable results. Recently, the inclusion of pts in trials may have been challenged due to the COVID 19 pandemic. During 2015-2021, the international Danish Breast Cancer Group (DBCG) SKAGEN Trial 1 randomized pts with high-risk early breast cancer (BC) to adjuvant loco-regional radiation therapy (RT) testing 50Gray/25 fractions (standard) versus 40Gray/15fractions (experimental). The trial included any pt with indication for loco-regional (LR) RT for unilateral early high-risk BC with no prior cancer and willing/able to participate in follow up. We present annual trial participation rates (TPRs) during the inclusion period.

Material and Methods
In the DBCG SKAGEN Trial 1, 17 institutions from 7 countries randomized 2,963 patients from 2015 to July 1st 2021. Eight institutions accruing 2,184 pts delivered data on the total number of pts treated with LR-RT during the inclusion period. We calculated annual TPRs (number pts enrolled per year/ number pts treated with LR-RT per year) per institution and overall.

Results
From 6,929 pts receiving LR-RT, 2,184 pts were enrolled, corresponding to an overall TPR of 31.5%. The average institutional TPR per year ranged from 14.4% to 50.4%. Most institutions experienced a decline in TPR during 2019-2020, while in 2021 TPR seemed to stabilize. In one institution, accrual was terminated during 2020 due to COVID 19 related restrictions.

Conclusions
TPRs varied considerably across institutions and time and were vulnerable to COVID 19 related restrictions. Even with the prospect of a shortened LR-RT course, only one institution succeeded in accruing more than half of the patients likely to be trial candidates. This implies a potential for better trial accrual. In future trials, systematic monitoring of TPRs and reasons for not participating should be undertaken to optimize trial designs and accrual procedures.

Clinical trials

#25: Barriers affecting participation in a randomized trial comparing radiotherapy with photons and protons among Danish patients with head and neck cancer

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Abstract
In Denmark, proton therapy (PT) is offered at the Danish Center for Particle Therapy in Aarhus. Adult patients with head and neck cancer (HNC) are offered PT only by participating in a clinical trial.
Compared with the population in general, patients with HNC are more socioeconomically and psychosocially disadvantaged. Such disadvantaged patients may have a lower participation rate in clinical trials.
This study aims to explore to which extent patients with HNC are assessed for inclusion in a trial comparing radiotherapy with photons and protons as well as reasons for non-inclusion.

Methods
Patients assessed to a clinical trial comparing photons and protons are prospectively registered at six Danish radiotherapy centers. The screening data contains information on whether patients were candidates for the trial, which requires an initial treatment plan comparison, and any reasons for non-inclusion. Furthermore, a cross-sectional study is in progress to measure correlations between participation in a proton trial and socioeconomic factors, the influence of geographical distance to proton center, as well as levels of health literacy, quality of life and anxiety.

Results
From October 2020 to February 2022, 427 Danish patients were assessed for inclusion.
Of these, 330 (77%) patients did not proceed to an initial treatment plan comparison and thus the possibility of trial inclusion. The reasons were primarily due to patients' rejection of trial participation, geographical distance to the treatment facility or if the clinician considered the patient ineligible.
In 97 patients (23%) a comparative treatment plan was performed and 50 of these comparisons indicated a potential benefit of protons, leading to trial inclusion.

Conclusion
The vast majority (77%) of patients assessed for trial participation did not proceed to the initial treatment plan comparison. More detailed studies are ongoing to explore the underlying factors and barriers to trial participation.

Clinical trials

#26: COLAR: Open-label clinical study of IL-6 blockade with tocilizumab for the treatment of immune checkpoint inhibitor-induced colitis and arthritis

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Abstract
Introduction
Immune-related adverse events due to immune checkpoint inhibitors (ICIs) are not always effectively treated using glucocorticoids and may negatively affect the anti-tumor efficacy of ICIs. Interventional studies of alternatives to glucocorticoids are lacking. We examined whether interleukin-6 blockade by tocilizumab reduced ICI-induced colitis and arthritis.

Materials and Methods
Patients with solid cancer experiencing Common Terminology Criteria for Adverse Events (CTCAE v5.0) grade >1 ICI-induced colitis/diarrhea (n=9), arthritis (n=9), or both (n=2) were recruited and treated with tocilizumab (8 mg/kg) every four weeks until worsening or unacceptable toxicity. Patients were not allowed to receive systemic glucocorticoids and other immunosuppressive drugs within a 14-day screening period. The primary endpoint was clinical improvement of colitis and arthritis, defined as ≥1 grade CTCAE reduction within eight weeks. Secondary endpoints were improvements and glucocorticoid-free remission at Week 24; safety; radiologic, endoscopic, and histological changes.

Results
Nineteen patients were available for efficacy analysis. Patients received treatment with pembrolizumab (n= 10), nivolumab (n=4) or ipilimumab and nivolumab (n=5) combined. Seven patients had been initially treated with glucocorticoids. Ten patients continued ICI therapy during tocilizumab. The primary endpoint was achieved in 15 of 19 (79%) patients. Additional one patient had ≥1 grade reduction at week 10, and another patient had stabilized symptoms. At Week 24, ongoing improvement without glucocorticoids (n=12), including complete remission (n=10), was noted. Five patients had grades 3–4 treatment-related adverse events, which were manageable and reversible.

Conclusions
Tocilizumab showed promising clinical efficacy and a manageable safety profile in treating ICI-induced colitis and arthritis. Our findings support the feasibility of randomized trials of immune-related adverse events.

Clinical trials

#27: The motivation of breast cancer patients to participate in a national randomized control trial

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Abstract
Introduction
Clinical trials are essential for the development of better cancer care, and the willingness of the patients to participate is therefore crucial for the ability to perform these trials. The aim of this study is to assess the motivation and thoughts of breast cancer patients concerning participation in a clinical trial.

Materials and Methods
21 patients participated in two semi-structed interviews about their motivation for participating in a clinical trial testing the efficacy of cryotherapy for the prevention of chemotherapy-induced peripheral neuropathy in breast cancer patients treated with paclitaxel. The two interviews took place before and after the intervention part of the trial. The interviews were coded and categorized following the steps in Braun & Clarke's thematic analysis to identify motivational factors and experiential themes.

Results
Four overarching themes have been identified: 1) reasons to participate in the clinical trial, 2) mental resources 3) safety, and 4) experience of the randomization. The most frequent reason to participate in the study was to support research and help others, furthermore many of the participants wanted to participate to get the intervention treatment. The study also showed that a surplus of mental resources played an important role when the patients decided to participate in the trial. Differences was found between the two randomization groups in relation to these overarching themes, e.g., the main reason to participate in the intervention-group was Altruism, while more wanted to get the cooling treatment or support research in the control group. The extra examinations were seen as given an additional safety by the patients.

Conclusions
This qualitative study found different factors influencing the experience of participating in a clinical trial, e.g., intervention-status, mental resources, and safety. This knowledge can be valuable in planning future intervention studies in breast cancer patients.

Clinical trials

#28: Sentinel lymph node mapping in early-stage cervical cancer – a national prospective multicenter study on accuracy and late effects (SENTIREC CERVIX)

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Abstract
Introduction
Implementing research into the clinical everyday setting is crucial. In a national multicenter study, we evaluated sentinel lymph node (SLN) mapping in women with early-stage cervical cancer (CC) and investigated the accuracy of SLN mapping in tumors >20 mm. The patient perspective was evaluated using patient-reported outcomes measures (PROMs).

Materials & Methods
We prospectively included women with early-stage CC from 2017-2021 to undergo SLN mapping. Women with tumors >20 mm underwent completion pelvic lymphadenectomy (PL). We determined SLN detection rates, the incidence of nodal disease, sensitivity, and negative predictive value (NPV) of SLN mapping. The incidence of lymphedema and its impact on quality of life was evaluated using validated PROMs before surgery and prospectively up to three years postoperatively.

Results
We included 245 women, and 38 (15.5%) had nodal metastasis. The SLN detection rate was 96.3%, with 82.0% bilateral detection. In a stratified analysis of 103 women with tumors >20 mm, 27 (26.2%) had nodal metastases. The sensitivity of SLN mapping adhering to the algorithm was 96.3% (95% CI 81.0-99.9%) and the NPV 98.7% (95% CI 93.0-100%). The incidence of early lymphedema was 5.6% in women who underwent SLN only and 32.3% in women who underwent SLN+PL. Reporting lymphedema was significantly associated with impaired body image, physical-, role-, and social functioning, and a higher level of fatigue and pain.

Conclusions
SLN mapping is a reliable and sensitive method to detect lymph node metastases in women with early-stage CC. Until the oncological safety is established, we recommend completion PL in women with tumors >20 mm. Lymphedema is significantly associated with impairment of several physical, psychological, and social aspects of quality of life. This study has changed the Danish national guidelines for nodal staging of women with early-stage CC and contributed with new evidence regarding lymphedema after SLN and PL.

Clinical trials

#29: Acute morbidity after loco regional breast radiation therapy in the randomized DBCG SKAGEN trial 1

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Abstract
Background
In the past, poor outcome after hypofractionated radiation therapy (RT) in breast cancer (BC) patients was observed. Thus, in Denmark, normofractionation with 50Gy/25fr was standard for early BC RT since 1982. In 2014, moderately hypofractionated RT became standard for patients treated with whole breast RT based on early results from the Danish Breast Cancer Group (DBCG) Hypo trial. The DBCG Skagen trial 1 was initiated to evaluate the risks and gains following 50Gy/25fr versus moderately hypofractionated loco-regional RT (LR_RT), 40Gy/15fr, of BC patients with indication for LR-RT. The primary endpoint was 3-year arm lymph edema. In this study, we report evaluation of acute morbidity, a secondary outcome of the trial.

Method
In this international, multi-center, randomized trial, pts operated for early BC, pT1-3, pN0-N3, M0 with an indication for LRRT were randomly assigned 50Gy/25fr (standard) versus 40Gy/15fr (experimental). Acute morbidities were graded using the CTCAE 4.0 and the RTOG/EORTC criteria at baseline, three and five weeks after start of RT. Hereafter, evaluations were made every 2 weeks as long as there were acute morbidities above baseline level. The maximum grading is reported here.

Results
From 2015 to 2021, 326 pts from six countries were evaluated for acute morbidity. In total, 172 pts were randomized to 50Gy/25fr and 154 pts to 40Gy/15fr No acute grade 4-5 morbidities were observed. For both randomization arms, grade 3 toxicity was observed in only 12% of the patients. The most common grade 2 toxicities were dermatitis 54% (50Gy/25fr) versus 27% (40Gy15fr) and fatigue 17% (50Gy/25fr) versus 16% (40Gy15fr), respectively.

Conclusion
In general, the frequency and severity of acute morbidity were low for patients treated with LR-RT regardless of randomization arm. Thus, moderately hypofractionated RT did not raise any safety concerns.

Clinical trials

#30: DAHANCA 33: A phase II, multicenter study of dose-escalated radiotherapy guided by functional imaging for patients with hypoxic head and neck squamous cell carcinoma (NCT02976051)

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Abstract
Introduction
Hypoxic cancer cells within a tumor have been shown to be resistant to radiation. This could lead to an increased risk of treatment failure in tumors treated with primary radiotherapy (RT). Hypoxic tumor areas can be visualized with PET-imaging and hypoxiasensitive tracers e.g., 18F-flouroazomycin arabinoside (FAZA). These resistant cancer cells can be targeted by increasing the dose to tumor volume. The main purpose of the study is to demonstrate improved curability with dose-escalated radiotherapy in locally advanced HNSCC patients identified by hypoxic FAZA PET scans.

Materials and methods
The study is an open, prospective, experimental single-arm, phase II multicenter study with a planned inclusion of 60 patients with stage III-IV squamous cell carcinoma of the larynx, pharynx, or oral cavity. In oropharynx tumors, only p16-negative tumors are allowed inclusion. Patients must be eligible to undergo treatment with hyperfractionated, accelerated radiotherapy (HART: 76 Gy/56 fractions, 2 fractions daily), concomitant hypoxic cell sensitizer nimorazole with or without low-dose cisplatin. A FAZA PET scan is carried out as part of radiotherapy planning. Patients with PET-visualized hypoxia within the primary tumor receives dose escalation with HART, nimorazole and weekly cisplatin. The dose escalation is prescribed to the entire target volume. The primary endpoint of the study is locoregional failure defined as persistent or recurrent disease in the tumor or regional lymph nodes. Elective neck dissection is not allowed. Secondary outcomes are overall survival, disease-specific death, acute and late treatment morbidity.

Results
As per April 26th 2022, a total of 49 patients are enrolled. A hypoxic volume is identified within tumors of 71% of patients. The study actively recruits patients.

Conclusions
The study contributes with knowledge on hypoxia-driven radiotherapy resistance and provides a radiobiologically driven treatment intervention.

Clinical trials

#31: Doctors' diagnostic accuracy of skin and mole cancer improved by more than 30% following 4 hours of self-directed pattern recognition training

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Abstract
Introduction
Skin cancer diagnostics is challenging and mastery requires years of practice, with continuous exposure to hundreds of lesions. Treatment is delayed in 25-28% of melanomas because they are referred from general practice (GP) to dermatologists outside of the cancer pathway, and the vast majority of pigmented lesions referred in cancer pathways are benign. This is costly for the society, leads to patient anxiety and longer referral time at the dermatologists' offices. We aim to test the efficiency of a newly developed digital patient-case-based pattern recognition training system on the diagnostic accuracy of Danish GPs.

Materials and Methods
GPs were invited at skin cancer sessions at "Lægedage" 2021. Participants filled out a questionnaire and answered a skin cancer multiple choice quiz (MCQ) with 12 patient-cases with prior validity evidence. As they entered the trial they were block randomized 3:1 to either access to the digital educational system with 2376 anonymised patient-cases with a clinical and dermoscopic image (Group A) or not (Group B). Group A had access for 8 days in which they were expected to complete 500 cases, requiring 3-4 hours of study time, followed by 8 days of no training ending with another MCQ. Group B took the same MCQs at day 0 and 16.

Results
256 doctors were invited, 132 GPs across all regions accepted and 119 answered the final MCQ. Of the 86 Group A doctors 72 used the system and increased their MCQ score by 29% (from 6.3 to 8.2 correct out of 12) compared to 0.03% for the 32 doctors from Group B who didn't have access. T-test p-value <0.001. They spend 4.4 hours on average. Changes in overdiagnosis and specificity of malignancy will be presented.

Conclusion
Digital case-based pattern recognition training is an effective educational modality. The system is freely available to all but should be a formalised part of training for all doctors that diagnose or treat skin cancer and melanoma: https://training.dermloop.io/

Clinical trials

#32: Metastatic colorectal cancer and treatment decision based on mutational testing on liquid biopsies – comparison of ddPCR and MassARRAY methods

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Abstract
Introduction
The aim was to investigate if mutational analysis of circulating tumor DNA (ctDNA) is feasible for deciding on anti-EGFR treatment. Secondary, to compare the ddPCR and MassARRAY methods.

Materials and methods
A prospective clinical feasibility study including patients with metastatic colorectal cancer; indication for systemic palliative treatment; and measurable disease (RECIST). Decision on anti-EGFR treatment was based on mutational status in ctDNA otherwise standard treatment regimens. Plasma samples drawn at inclusion were prospectively analyzed by a multiplex ddPCR (Bio-Rad). Feasibility endpoints; quality and turn-around time of ctDNA analysis. Failure parameters; low quality of samples, transportation to lab >3 working days (WD), results delivered >7 WD. Plasma samples were analyzed retrospectively by a mass spectrometric based multiplexed platform (MassARRAY® Agena Bioscience), using the UltraSEEK Colon Panel. Standard mutational testing on tumor tissue.

Results
Forty-nine patients included. One sample failed quality parameters. Concordance between mutational status in tissue and plasma by ddPCR was 70%. Comparing the concordant and disconcordant cases, there was no difference in treatment response (p=0.46) but longer progression free survival (HR=2.1 95%CI 1.05-4.27, p=0.04) and a trend to longer overall survival (HR=2.3 95%CI 0.97-5.32, p=0.06) among disconcordant cases. Agreement between mutational status in tissue and plasma by MassARRAY was 80%. All but one mutation detected by ddPCR were detected by MassARRAY. In four patients (9%), who were wild type by ddPCR, MassARRAY detected a mutation, which were in the ddPCR panel and present in tumor tissue.

Conclusions
Using ctDNA for mutational detection by ddPCR in daily clinic proved feasible. Treatment response and survival among disconcordant cases were not inferior to concordant cases. Mutational testing by MassARRAY seemed to have a better concordance with tissue status than ddPCR.

Clinical trials

#33: From research to 'real life': how to adapt an effective intervention from a clinical trial to the everyday life in the clinic

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Abstract
INTRODUCTION
The Herlev Hospital Empowerment of Relatives through More and Earlier information Supply (HERMES) intervention is a conversation between the caregiver and an oncology nurse in which 1) the caregiver's unmet needs for information are identified through a 14 item-instrument, and 2) the nurse provides the caregiver with the lacking information. Our randomised controlled trial (n=199) showed that the intervention improves the caregivers' experiences of information, communication and attention from oncology health care professionals (HCPs). While feasible in an RCT, adaptations to facilitate wider uptake in the healthcare system was needed. The aim was to report the results of the first steps of the adaptation of the HERMES intervention to promote its uptake in the clinical everyday life for cancer patients.

METHODS
The adaptation process included several steps with input from various stakeholders: 1) nurses who had used the intervention identified barriers and solutions in discussions with the research group, 2) solutions were discussed in two focus group interviews with HCPs, 3) the solutions were implemented in collaboration with a software programmer and with feedback from a patient user panel and 4) the adapted intervention was tested by two HCPs and five caregivers.

RESULTS
The following adaptions of the intervention were made: a) instead of administrating the 14 information items on paper, a caregiver app for mobile phones was developed, b) instead of HCPs leading the intervention, the caregivers became responsible for using the app and showing their answers to the HCPs and c) instead of planned conversations, the discussion of the caregivers' answers could happen at any time.

CONCLUSION
We have succeeded in adapting the HERMES intervention in a way that has preserved the essence of the intervention and have minimised the use of resources in the clinic. In the next steps, we will test the consequences of the adaptions on effect and feasibility.

Clinical trials

#34: DAHANCA 37:Gen-bestråling af hoved-halskræft med proton-strålebehandling (NCT03981068)

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Abstract
Introduktion
Hvis man én gang er strålebehandlet mod hoved-halsområdet er det problematisk at give en ny strålebehandling for et tilbagefald eller en ny kræftknude, pga. risikoen for alvorlige, inklusiv livstruende, bivirkninger. Hvis genbestråling er patientens eneste mulighed for at blive rask, kan strålebehandling med protoner nedsætte den samlede stråledosis til patienten, og måske nedsætte risikoen for alvorlige bivirkninger.

Materialer og metoder
DAHANCA (den Danske Hoved-Halskræft Gruppe) har startet en fase II genbestrålingsprotokol med vide inklusionskriterier. Den oprindelige stråleplan skal være til rådighed således at man kan lave en samlet dosisplan for både den oprindelige og den aktuelle dosisplan. Patienterne diskuteres på en national videokonference før henvisning. Egnede patienter vil blive tilbudt hyperfraktioneret accelereret strålebehandling med 60 Gray på 50 behandlinger, 10 behandlinger om ugen. Det primære endepunkt er alvorlige bivirkninger (CTC grad ≥ 3). Vigtige sekundære endepunkter bliver tumorkontrol, patient rapporterede symptomer og livskvalitet. Det er planlagt at inkludere 20 patienter.

Resultater
Otte patienter, 47-87 år, er behandlet i protokollen siden 1. kvartal 2020. Syv mænd, syv p16 negative, en p16 ukendt. Tre yderligere patienter blev diskuteret på videokonference og blev ikke tilbudt behandling i protokollen. Der er ikke rapporteret alvorlige bivirkninger til behandlingen endnu. Generelt er der henvist færre patienter til protonstrålebehandling end forventet, og det gælder også denne protokol.

Konklusion
Med de tilgængelige samlede dosisplaner og adgang til strålebehandling med protoner mener vi at kunne tilbyde patienten skånsom strålebehandling. De tidligste erfaringer viser at det er produktivt at diskutere patienterne nationalt, og udvikle mere ens kriterier for patient udvælgelse. Med studiet får vi ny viden om de forventede bivirkninger og den optimale udvælgelse af patienterne.

Clinical trials

#35: DAHANCA 30 - Et randomiseret non-inferiority studie af hypoxi-profilvejledt nimorazolbehandling i forbindelse med primær strålebehandling af planocellulære hoved-halskarcinomer (NCT02661152)

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Abstract
Introduktion
Tumorhypoxi medfører stråleresistens og dårligere outcome ved behandling af iltfattige kræftknuder i hovedhalsområdet med stråleterapi. Nimorazol er en hypoxisk radiosensitizer, som, givet sammen med stråleterapi, er vist at reducere stråleresistensen og dermed forbedre stråleeffekten i iltfattige kræftknuder. Præparatet gives i dag til en stor del af strålebehandlede patienter med hoved-halskræft, velvidende at det formentlig kun er virksomt hos undergruppen med de mest iltfattige svulster. Med en hypoxi gen-profil tyder det på, at man kan udpege såvel de iltfattige svulster, der har gavn af nimorazol (respondere), som de iltrige svulster, hvor nimorazol ikke har væsentlig betydning (non-respondere). Ved at undlade brug af nimorazol hos gruppen af nonrespondere kan disse patienter spares for bivirkninger til præparatet (f.eks. kvalme og madlede), hvilket har relevans da ernæringssituation i forvejen ofte er belastet hos disse patienter. Formålet med studiet er, at eftervise, hvorvidt hypoxi gen-profilen kan udpege patienter som ikke har gavn af nimorazol under strålebehandling.

Materiale og metoder
Patienter med planocellulær hoved-halskræft, hvor der er indikation nimorazol under strålebehandling kan inkluderes. Studiet er et randomiseret non-inferiority studie med planlagt 1262 randomiserede patienter. Hos inkluderede patienter foretages hypoxi profil. Hvis denne tyder på en iltrig kræftknude, randomiseres til behandling +/- nimorazol. Hvis profilen tyder på en iltfattig kræftknude får patienten standardbehandling (inkl. nimorazol).

Resultater
Ultimo 2021 er der 1010 inkluderede patienter, hvoraf 700 er randomiserede.

Konklusion
Inklusionen i studiet er stabil og det fortsætter som planlagt. Der er til dato ikke set uventet toksicitet hos de patienter der indgår i studiet.

Clinical trials

#36: DAHANCA 34: Livskvalitet efter robotkirurgisk behandling sammenlignet med strålebehandling hos patienter med tidlige stadier af mundsvælgkræft: en national randomiseret undersøgelse

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Abstract
Introduktion
Forekomsten af mundsvælgkræft (mandler og tungerod) er stigende i Danmark, på nuværende tidspunkt diagnosticeres ca. 450 patienter årligt. Standardbehandlingen er strålebehandling med eller uden kemoterapi. Strålebehandlingen er effektiv, men giver også bivirkninger både på kort og lang sigt. Siden 2013 er Transoral robotkirurgi (TORS) indført som en ny eksperimentel behandling til tidlige stadier af mundsvælgkræft. Flere mindre forsøg fra udlandet tyder på, at overlevelsen efter TORS eller strålebehandling er ligeværdig. Forhåbningen er, at TORS er en mere skånsom behandlingsmodalitet med færre bivirkninger. Formålet med dette nationale randomiserede studie er derfor at sammenligne livskvalitet og synkefunktion efter primær TORS i forhold til primær onkologisk behandling.

Materialer og metoder
Prospektivt nationalt randomiseret fase II studie, der randomiserer til henholdsvis robotkirurgi eller strålebehandling i en 2:1 ratio (ClinicalTrials.gov: NCT04124198). Det primære endepunkt er ændring i MD Anderson Dysphagia Inventory (MDADI) 12 måneder efter behandling. Forsøget udføres som et DAHANCA (Danish Head and Neck Cancer Group) studie og er planlagt til at inkludere 138 patienter.

Resultater
Der inkluderes patienter fra Region Hovedstaden, Region Sjælland, Region Syd, Region Midt og Region Nordjylland. Studiet startede med inklusion i 2019. Der er til dato inkluderet 57 patienter og studiet forventes afsluttet i 2025.

Konklusion
Vi ønsker med dette studie at undersøge forskellen på livskvaliteten og synkefunktion efter behandling med TORS sammenlignet med strålebehandling hos patienter med mundsvælgkræft.

Clinical trials

#37: Initial results from the Danish Anal Cancer Group (DACG) II trial. - Bone sparing radiotherapy for anal cancer

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Abstract
Introduction
We recently found a high frequency (50%) of pelvic insufficiency fractures (PIF) in patients treated with radiotherapy (RT) for anal cancer. Further, we found the risk of PIF related to radiation dose to pelvic bone substructures.
Based on these data we initiated, a national phase II trial, DACG II, with bone sparing RT for anal cancer giving constraints and priority to bone substructures. Here we present the initial results from the bone optimized dose planning.

Materials and methods
Patients with anal cancer eligible for definitive chemo-RT were included. Standard delineation of organs at risks (OAR) comprised bowel bag, bladder, femoral heads, sacral bone, penile bulb, female external genitalia.
Bone delineation included: sacroiliac-joints, sacral alae, acetabulum, symphysis, and total pelvic bones. A bone-optimized plan was generated with following priority: Target coverage>bowel bag> SI-joints/ Sacral Alae> bladder> external female genitalia/penile bulb> acetabulum/symphysis> total pelvic bones. Plan optimization criteria were: V30 Gy<55% for pelvic bone substructures and comparable dose to other OARs. Wilcoxon signed rank test was used for comparison and $p<0.05$ considered statistically significant.

Results
5 standard plans and 5 bone-sparing plans were generated in a two-step planning process (all 3 arc VMAT). Dose to CTVT(tumor) and N (lymph node) was 54-60 Gy in 30 fractions and dose to CTV-E(elective) was 48 Gy in 30 fractions.
Significant sparing was seen for all delineated bone substructures, $p<0.05$, while dose to standard OARs were comparable. Planquality indices were not compromised (PTV coverage, conformity indices, mean dose and V30% (cm3) to non-contoured normal tissue).

Conclusions
Significant sparing of pelvic bone substructures is feasible with optimization and modulation of standard plans without compromising dose to standard OARs or plan quality. Inclusion is ongoing and evaluation of plan quality will continue.

Clinical trials

#38: Testing the strength and healing of interlocking robot-guided laser osteotomies in the extremities performed by CARLO

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Abstract
Introduction
Sarcoma is a life-treating disease, which is particularly resistant to both chemo- and radiotherapy therefore surgical treatment of sarcomas is an essential part of a comprehensive management. Free fibula grafts are to date commonly used in reconstruction after sarcoma resection in the meta- or diaphysis, however, nonunion does occur because of improper stability, blood supply or alignment. CARLO (Cold Ablation Robot-guided Laser Osteotome) is a miniaturized robotic laser system that is able to cut interlocking dovetail osteotomies. We hypothesis that interlocking osteotomies could markedly increase initial bony stability, which in return will lower the risk of nonunion.

Materials and methods
This study will use 8 sheep that were bred for scientific purposes. 4 sheep will be randomized to interlocking osteotomies and 4 will be randomized to conventional internal fixation. The 4 sheep randomized to interlocking osteotomies will be initially CT-scanned and the acquired imaging data will be used to virtually plan interlocking dovetail osteotomies which will be subsequently fixated using a biodegradable screw. The 4 sheep undergoing conventional internal fixation will have a transverse osteotomy performed in the radius area using an oscillating saw, and will be fixated with an internal osteosynthesis plate and screws according to the AO principles. The sheep will be euthanized after 6 weeks. The mechanical properties of the two groups will be tested in terms of torsional and shear strength. The mechanical tests will be performed as destructive load tests and the bone reconstructions will be tested until failure by means of push-out tests. Healing will be assessed using histomorphometric analysis to histologically and quantitatively assesses the amount of newly formed bone.

Clinical trials

#39: Daily delivered dose in NSCLC patients receiving dose escalation

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Abstract
Introduction
Large anatomical changes may occur during RT of lung cancer potentially leading to overdosage of organs at risk (OAR) or decrease in tumor dose. The daily delivered dose can be calculated based on CBCT scans used for patient positioning. We report on actual delivered dose, that may be calculated real time, in lung cancer patients included in the NARLAL2 dose escalation trial.

Materials and methods
We investigated 11 patients included in the NARLAL2 trial. We analyzed the plans created for the experimental arm of the trial, were dose escalation was driven by the GTV part with highest FDG-PET uptake, but limited in favour of OAR constraints. Patients were set up according to the GTV-T position on the daily CBCTs. If deviations above tolerance was seen in 3 consecutive fx, the patients were referred for rescanning. Contours delineated on planCT (pCT) were deformably propagated to each CBCT using the online registration (MIM Software). Dose was calculated for the CBCTs based on stoichiometric calibration curves yielding mean deviations for the mean dose of 0.2%±0.7%. Dose to 99% of CTV-T and CTV-N and D1cc to OAR were analyzed. Dose parameters were compared between pCT and daily CBCTs.

Results
We can show the effect of our adaptive strategy with a more consistent target coverage. However, for one of the 11 patients the adaption of the RT plan could have been saved based on the calculations. For the OAR, overdosage was seen for esophagus, bronchi, and heart in two patients. No overdosage was seen for trachea or spinal cord. Overdosage of the esophagus and bronchi was originating from tumor shrinkage.

Conclusion
Heterogeneous dose escalation in lung cancer patients may lead to overdose of OAR due to anatomical changes during the seven weeks of radiotherapy. Daily dose calculation based on CBCT used for setup, can be a tool for a better assessment of when to adapt a treatment plan, leading to less overdosage of OAR and fewer unnecessary plan adaptions.

Clinical trials

#40: Improving hand hygiene compliance among healthcare workers – the effect of light-guided nudging in two departments of oncology and hematology

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Abstract
Introduction
Hospital-acquired infections continue to burden 7-10% of all patients but can be reduced by improving hand hygiene compliance (HHC). We aimed to investigate the effect of light-guided nudging on healthcare workers' HHC.

Material and Method
A seven-month, prospective, interventional study has been conducted at two departments (oncology and hematology) at Aarhus University Hospital, Denmark.
An electronic monitoring system (sani nudgeTM) was developed and used to collect data on 211,560 hand hygiene opportunities. The two departments are described as group 1 and group 2. HHC were measured though two intervention periods with light-guided nudges displayed on the alcohol-based hand rub dispensers:
• Intervention period 1:
Group 1: Reminder nudge (A blue light appeared when the healthcare worker passed the alcohol-based hand rub)
Group 2: Feedback nudge (A green light appeared immediately after the healthcare worker had used the alcohol-based hand rub)
• Intervention period 2:
Group 1 and 2: Received both the Reminder nudge and the Feedback nudge
Hand hygiene opportunities and alcohol-based hand rub events were measured in patient rooms, medication rooms and staff toilets. Data was provided as HHC rates (%) with 95% CI.

Results
At baseline, HHC was higher for group 2 in medication rooms +25% (19-32%) and staff toilets +16% (11-21%).
HHC increased in intervention period 1 relative to baseline: in patient rooms, group 1 +6% (4-9%) and group 2 +10% (7-13%); in medication rooms, group 1 +21% (13-29%) and group 2 +14% (9-18%). In staff toilets, HHC only increased in group 1 +15% (8-21%). Overall, HHC remained at the higher levels during intervention period 2 and in the follow-up period.

Conclusion
HHC increased in intervention period 1 relative to baseline. Group 1 +6% (4-9%) and group 2 +10% (8-13%). Group 1 remained HHC at the higher level (+0.8, 0-2%) and group 2 increased further +5% (2-8%) during the second intervention period.

Clinical trials

#41: Sentinel lymph node mapping in women with endometrial cancer, a multicenter study with national protocolled implementation (SENTIREC)

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Abstract
Introduction
Sentinel node (SN) mapping has showed increased sensitivity to detect lymph node metastases (LNM) in women with early-stage low-risk endometrial cancer (EC). However, in this group, an adoption of SN mapping will lead to extended surgery, and limited evidence exists on the risk of lymphedema and survival. For women with early-stage high-risk EC, the implementation of SN mapping and the sensitivity of preoperative FDG-PET/CT imaging to detect LNM remain controversial. The study aims to assess the accuracy, safety and morbidity of SN mapping for women with early stage EC. Further, we will evaluate the rate and severity of lymphedema after SN mapping using patient-reported outcome measures (PROMs).

Materials and methods
In this national prospective multicenter study SN mapping was implemented in women with low-risk EC. In women with high-risk EC, FDG-PET/CT scan was performed before surgery. During surgery, SN mapping was followed by removal of FDG positive nodes and radical pelvic and paraaortic lymphadenectomy. All women completed validated PROMs on lymphedema and quality of life (QOL) before surgery and 3, 12, 24, and 36 months post-surgery.
The primary outcomes for low-risk and high-risk EC is lymphedema and the negative predictive value of SN mapping, respectively. Secondary outcomes are SN detection rates, accuracy analyses of SN mapping and FDG-PET/CT, besides lymphedema and QOL.

Results
Four gynaecological cancer centres participate. The inclusion in study I is complete with 393 women with SN mapping, and completed PROMS before- and 3 months post-surgery. Analyses are pending, the first results are expected in August 2022.

Conclusion
With this project a paradigm shift was implemented regarding the surgical treatment of EC in DK. We expect the project to add substantial new evidence to the field regarding risk and benefits for low-risk EC and regarding the safety of replacing systematic lymphadenectomy with SN mapping in high-risk EC.

Clinical trials

#42: Exploring the benefits of adaptive radiotherapy in NSCLC-patients

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Abstract
Introduction
Locally advanced NSCLC (LA-NSCLC) is treated with the same chemo-radiotherapy strategy, irrespective of histology. A recent study has shown improved overall survival (OS) and progression free survival (PFS) using adaptive radiotherapy (ART). This study investigates if the benefits of ART are dependent on histology.

Methods
ART was implemented in the treatment of LA-NSCLC patients at a single institution in April 2013. 184 (100 adenocarcinoma (AC) and 84 squamous cell carcinoma (SCC)) consecutive patients prior and 255 (156 AC and 99 SCC) consecutive patients after implementation of ART were retrospectively reviewed. Baseline characteristics (age, stage, chemotherapy, performance status (PS)), mean heart dose (MHD), mean lung dose (MLD), GTV-volume and administration of immunotherapy for recurrences were collected. Patients were split in 2 groups by AC/SCC. Overall survival was analyzed with multivariate cox regression. Kaplan-Meier curves were plotted for the four groups by pre-ART/ART and AC/SCC and compared using log-rank test.

Results
Median follow-up for the combined cohort was 24 months. Treatment and patient-characteristics were similar for all groups but patients in the ART-group received more chemotherapy ($p<0.01$) and had lower MLD and MHD. Multivariate cox regression of OS for AC showed significant correlation between OS and GTV-volume (HR=1.0027 pr. mL increase, $p=0.02$), while cox regression for SCC showed significant correlation with GTV-volume (HR=1.003 pr. mL increase, $p<0.01$), chemotherapy (HR=0.64, $p=0.02$), MLD (HR=1.06 pr. Gy, $p=0.02$) and PS (HR=0.65, $p=0.02$). ART was borderline significant for SCC (HR=0.69, $p=0.05$). The impact of ART on SCC increased 2-year OS from 31% to 54.5%, while OS was unchanged for AC.

Conclusion
ART increases OS, but the impact seems to depend on histology. ART primarily leads to an improved overall survival for patients with SCC.

Clinical trials

#43: Introduction of Salvage Prostatektomi in Denmark. DaProCa7

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Abstract
Introduction
The goal was to introduce robot-assisted salvage prostatectomy (sRARP) as a nationwide option for the more than 100 Danish patients who yearly experience relapse after radiotherapy for high-risk prostate cancer (PCa). Here we present the pilot series and describe the initial experience with sRARP in a Danish context. The study was anchored within the Danish Prostate Cancer Group (DaProCa) and was funded by the Danish Health Authorities. We aim to establishment for two centers, which covers the entire population. The primary endpoints were peri-operative safety and early functional outcome

Materials and methods
Between April 2020 and July 2021, 18 potential candidates for sRARP underwent screening. All patients underwent PSMA-PET/CT, prostate MRI and transrectal prostate biopsy. Thirteen patients were excluded based on metastatic disease (7), extensive comorbidity (3), inoperable (2), and patient preference (1). The remaining 5 patients all underwent sRARP. All included patients had biochemical recurrent disease after standard external beam radiation with 78Gy/39 fractions with 3 years of androgen deprivation

Results
The median age of the included patients was 71 years and their median PSA at surgery was 3.8 ng/ml (range 2.2-4.0). All patients were discharged within 48 hours and no major complications were observed within 3 months. One patient experienced vesicourethral anastomosis leakage was treated conservatively. At follow-up 3 months after surgery all patients reported considerable incontinence. For patients with 12 month or longer follow-up, pad usage decreased to 1 or 2 pads daily. All patients had unmeasurable PSA (<0,1ng/ml) at 9 months after surgery. For patients with longer follow-up than 9 months, PSA remained unmeasurable for all but one patient. Median follow up was 15 months

Conclusion
In the pilot series, sRARP appears safe without major per- or postoperative complications. In addition, sRARP appers to offer good tumor control

Clinical trials

#44: The national implementation of patient reported outcome for patients with prostate cancer. DaProCa6

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Abstract
Introduction
In prostate cancer, as in oncology in general, patient-centeredness is an important component in high quality treatment and care provided to every patient. In this context, there is an increasing interest in understanding the patient's experience in an unbiased manner with the use of patient reported outcome (PRO), where patients directly report quality of life, symptoms, physical functioning, emotional wellbeing, social support and global assessments. Thus, the benefits of PRO are numerous and ranging from improved patient-clinician communication, awareness and management of symptoms to improved patient satisfaction and overall survival. We aim to implement PRO to every prostate cancer patient in Denmark

Methods
To ensure the success of the implementation, we started the implementation in three urological departments (Aarhus, Herlev and Odense) and in The Department of Oncology (Aarhus). A working group directed by Danish Health Authority selected the questionnaires and algorithm. The electronic system for PRO was adapted to the existing electronic infrastructure within each Region. We created structured plans for the use of PRO for the individual stages and treatment regimens within follow-up of prostate cancer patients The study was supported by The Danish Prostate Cancer Group (DaProCa), The Danish Clinical Quality Program (RKKP), and The Danish Cancer Society

Results
The implementation is ongoing until June 2022, at which time we anticipate that more than 90% of patients receiving curative treatment at the involved departments, are enrolled in PRO, and will continue in PRO during their treatment and follow up. The PRO data will be analyzed and used for the establishment of new national indicators in collaboration with RKKP

Conclusions
The implementation of PRO for patients with prostate cancer has been successful. The next step is to involve all relevant departments and expand PROs to the patients treated with active surveillance or palliation

Clinical trials

#45: Characteristics of long-term survivors with peritoneal metastasis (PM) from gastric, pancreatic, colorectal or ovarian cancer treated with pressurized intraperitoneal aerosol chemotherapy (PIPAC)

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Abstract
Introduction
The use of PIPAC in patients with PM is increasing in Europe. We investigated characteristics among long-term survivors (LTS) treated with PIPAC.

Materials and methods
Retrospective analysis of prospectively collected data from PIPAC-OPC1 and -OPC2 trials.
Cut-off for long-term survival was defined as 18 months for patients with PM from gastric (GC), pancreatic (PC) or ovarian (OC) cancer, and 24 months in patients with PM from colorectal cancer (CRC).

Results
A total of 137 patients with GC (39), PC (27), OC (29) and CRC (42) were included. Nine patients (four females) with GC were LTS. Median age was 69 years (range 46-78), seven patients had primary tumor in situ. They had palliative chemotherapy before PIPAC (median one line, range 1-3), and five had bidirectional treatment. Median overall survival (mOS) from PM diagnosis 22.0 months (20.1-28.3). mOS from PIPAC 1 16.4 months (4.7-23.3). Eleven patients (four females) with PC were LTS. Median age was 63 years (48-73), and eight patients had primary tumor in situ. Median one line of palliative chemotherapy before PIPAC (1-3), and four had bidirectional treatment. mOS from PM diagnosis 23.1 months (19.3-39.6). mOS from PIPAC 1 14.4 months (3.8-28.1). Twenty-four patients with OC were LTS. Median age was 61.5 years (40-56), and seven patients had primary tumor in situ. Median two lines of palliative chemotherapy before PIPAC (1-8), and none had bidirectional treatment. mOS from PM diagnosis 42.1 months (16.1-143.8). mOS from PIPAC 1 8.5 months (1.9-28.3). Twenty-two patients (nine females) with CRC were LTS. Median age was 61 years (38-75), and five patients had primary tumor in situ. Median one line of palliative chemotherapy before PIPAC (1-2), and four had bidirectional treatment. mOS from PM diagnosis 38.7 months (24-66.1). mOS from PIPAC 1 20.9 months (3.3-53.5).

Conclusion
Patients with PM from various primary tumors treated with systemic chemotherapy and PIPAC can become LTS.

Clinical trials

#46: DAHANCA 35 – A national randomised trial of proton versus photon radiotherapy for the treatment of head-neck cancer (NCT04607694)

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Abstract
Introduction
Proton therapy offers theoretical advantages in reducing morbidity from head and neck cancer radiotherapy compared to standard radiotherapy. However, study designs are challenging as not all patients may benefit from proton treatment. The Danish Head and Neck Cancer Group (DAHANCA) has planned a randomised trial in an enriched population of head-neck cancer patients aimed at reducing the risk of late dysphagia and xerostomia. The enrichment lies in the plan comparison, where only patients with a normal tissue complication probability (NTCP) reduction in favor of protons can be randomised.

Materials and Methods
Patients with squamous cell carcinoma of the pharynx or larynx at all six Danish head-neck cancer centers are offered a protonphoton plan comparison. In case of a pre-specified NTCP reduction in favor of proton treatment for dysphagia (6 months) ≥ grade II (DAHANCA toxicity score) or xerostomia (6 months) ≥grade II (EORTC HN35), the patient is offered inclusion into the DAHANCA 35 study and randomised between proton (Aarhus) or photon (local) treatment in the order 2:1. Patients selected based on the risk of dysphagia (D) or xerostomia (X) are analysed separately, with the primary endpoint being the selection criteria (DAHANCA 35 D and X). An estimated 327 and 216 patients are needed for DAHANCA 35 D and X, respectively. As some patients are expected to be included based on a reduced risk of both late complications, the total number of patients is expected to be lower.

Results
The randomised study was initiated in spring 2021, and by April 2022, 70 patients had been randomised. These constitute 32 patients from the Capital Region, 15 from the Central Region, 9 from the Northern Region, 7 from the Southern Region and 7 from the Zealand region. The vast majority of patients were included based on an anticipated reduction in the risk of dysphagia.

Conclusions
The randomised DAHANCA 35 study has been initiated and is actively recruiting.

Clinical trials

#47: Combined Endoscopic and Laparoscopic Surgery (CELS) for early colon cancer in high-risk patients

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Abstract
Background
The introduction of screening programs for colorectal cancer has resulted in an increased detection and incidence of early cancers (T1-T2). Local excision of the tumor could be an option in selected patients with high risk of complications to surgery.

Aim
Assess feasibility and safety in high risk patients with early colon cancer treated with CELS resection.

Method
A non-randomized prospective feasibility study conducted at four hospitals (Zealand University Hospital, Herlev University Hospital, Bispebjerg University Hospital and Hvidovre University Hospital). Our aim was to include 25 patients. Inclusion criteria: Patients with PS (Performance Status) score ≥1 and /or ASA (American Society of Anesthesiologists) score ≥3, and clinical UICC stage 1 colon tumor suitable for CELS resection.

Outcome
Failure after CELS resection (defined as either incomplete resection (R1/R2), local recurrence within 3 months, complication related to CELS within 30 days (Clavien-Dindo grade ≥ 3) or death within 30 days of any cause or death within 90 days due to complications to surgery)

Results
We have included 25 patients with clinical UICC stage 1 colon cancer (15 cT1 and 10 cT2). The primary outcome “failure after CELS resection” occured in one patient (incomplete resection margin in benign tumor). Final histopathological examination showed seven pT1, nine pT2, six pT3 tumors and 3 benign lesions. Three patients where converted perioperative due to tumor placement or size. Six patients were allocated to re-resection due to histological risk factors for lymph node metastasis. None of them had lymph node metastasis. One patient developed a metacronous tumor during follow up, and was subsequently resected. No serious adverse events or local recurrences occurred.

Conclusion
We experienced only one failure despite the new method implemented at multiple centers.

Emerging Treatments:

Poster #48-52

Emerging treatments

#48: Rethinking individual patient fixation in adjuvant radiation therapy of breast cancer

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Abstract
Introduction
The incidence of patients (pts) with early breast cancer (BC) treated with adjuvant radiation therapy in a vacuum bag (VB) has increased since initiation of the Danish Breast Cancer Group (DBCG) Proton trial. The frequency and reason for more individualized treatment planning preparation is reported from a single institution.

Methods
Patient, tumor and treatment characteristics were collected from the Electronic Patient Journal and the information system of Varian for patients treated in a vacuum bag. The time period of interest was the first six months of 2019 and 2021 representing the status before and after initiation of the DBCG Proton trial as of June 2020. Only pts with early BC and indication for adjuvant radiation therapy were candidates. Since 2019, pts with bilateral BC have routinely been treated in a VB for correct application of the Varian Truebeam respiratory gating system.

Results
During 2019 five pts were treated in VB, and they all had a VB due to restricted mobility of the ipsilateral arm. During 2021, 20 pts were treated in VB. Nine pts (45%) were treated in VB due to restricted mobility of the arm, seven (35%) due to bilateral BC and three pts (15%) had a VB to decrease the radiation dose to organs at risk (lungs and heart). For one pt the reason was not indicated. A lateral-decubitus position was used as a new technique in two cases to decrease the radiation dose to organs at risk.

Conclusions
Since initiation of the DBCG Proton trial, the photon clinic further individualized the photon radiation therapy by using more individualized treatment positioning and introducing the lateral-decubitus position. Furthermore, the level of accepting restricted arm mobility was lowered causing an increased number of pts with arm problems to be treated in a VB. It is likely that more pts may gain from using a VB and alternative treatment positions. Guidelines for identifying candidates for radiotherapy in a VB should be developed.

Emerging treatments

#49: DEPeNDS - Hvilke patienter med lavgradsgliomer skal have protonterapi?

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Abstract
Introduktion
Patienter med hjernekræft var de første der blev behandlet med protonterapi på Dansk Center for Partikelterapi. Men at udvælge, hvem der har mest gavn af protonterapi, kan være svært. I Danmark laver vi plansammenligning af foton- og protonplaner for alle patienter med lavgradsgliomer, og kræftlæger fra hele landet tager derefter stilling til, om patienterne skal tilbydes protonterapi eller ej. Vi har udviklet computermodellen DEPeNDS, som kan hjælpe lægerne i denne beslutningsproces, for at sikre at alle patienter I hele landet bliver tilbudt samme behandling.

Materialer & Metoder
61 tidligere behandlede patienter med gliomer grad 1-3 blev brugt til at træne og validere DEPeNDS-modellen ved tre forskellige workshops. Modellen blev udviklet efter anden workshop (42 patienter) og herefter valideret på tredje workshop (19 patienter). Ved hver workshop valgte mellem 8-11 læger individuelt behandlingsmodalitet baseret på nye foton- og protonplaner samt forskellige kliniske parametre, som bl.a. alder, diagnose, performance status og komorbiditet.

Resultater
Tre fjerdedele eller flere af lægerne var enige i valget mellem foton- og protonterapi for 61%, 67% og 79% af patienterne ved de tre workshops. Alder og middeldosis til den ikke-involverede hjerne (hjerne-hjernestamme-klinisk targetvolumen) var signifikante for lægernes valg mellem foton- og protonterapi. DEPeNDS-modellen er derfor baseret på disse parametre. Ved valideringen var modellen 12% mindre tilbøjelig end lægerne til at vælge protonterapi, med en standardafvigelse på 21%.

Konklusioner
Alder og forskel i middeldosis til den ikke-involverede hjerne var afgørende parametre for valget mellem foton- og protonterapi. DEPeNDS-modellen var 12% mindre tilbøjelig til at vælge protonterapi i forhold til lægerne ved valideringsworkshoppen. Modellen er implementeret i vores dosisplanlægningssystem og skal testes på de næste patienter til de nationale plankonferencer.

Emerging treatments

#50: Abdominal tissue concentrations and penetration of carboplatin in a HIPEC procedure - assessment in a novel porcine model

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Abstract
Objective
Peritoneal dissemination from intraabdominal cancers is associated with poor prognosis and rapid disease progression. Hyperthermic intraperitoneal chemotherapy (HIPEC) is an antineoplastic treatment, which has improved survival and recurrencefree survival, but little is known about the acquired chemotherapy concentrations in local tissues. The aim of this study was to assess concentrations of carboplatin during and after HIPEC treatment dynamically and simultaneously in various abdominal organ tissues by means of microdialysis in a novel porcine model.

Methods
8 pigs underwent imitation cytoreductive surgery followed by HIPEC (90 min) using a carboplatin dosage of 800 mg/m2. Microdialysis catheters were placed for sampling of drug concentrations in various solid tissues: peritoneum, liver, bladder wall, mesentery and in different depths of one mm and four mm in the hepatoduodenal ligament and rectum. During and after HIPEC, dialysates and blood samples were collected over eight hours.

Results
No statistically significant differences in mean AUC0-last (range: 2657-5176 min\bullet\mug/mL), mean Cmax (range: 10.6-26.0 \mug/mL) and mean Tmax (range: 105-206 min) were found between the compartments. In plasma there was a tendency towards lower measures. No difference between compartments was found for tissue penetration. At the last samples obtained (450 min) the mean carboplatin concentrations were 4.9-9.9 \mug/mL across the investigated solid tissues.

Conclusion
Equal carboplatin distribution in abdominal organ tissues, detectable concentrations for at least six hours after HIPEC completion, and a carboplatin penetration depth of minimum four mm were found. The present study proposes a new HIPEC porcine model for future research.

Emerging treatments

#51: LEVECA-studiet. LEvermetastaseresektion ved VEntrikel- eller GastroEsofagealJunktion-CAncer. Radikal kirurgi for avanceret ventrikel- eller GEJ-cancer med oligometastatisk disseminering, et eksperimentelt studie

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Abstract
Introduktion
Der findes ikke et kurativt behandlingstilbud til patienter med ventrikel- eller GEJ-cancer med levermetastaser. Prognosen er dårlig selv med palliativ kemoterapi, og 2-års overlevelsen er på ca. 15%. Udenlandske studier, hvor patienter har fået foretaget metastatektomi i kombination med radikal kirurgi og kemoterapi, har vist overlevelsesgevinst ved kirurgisk tilgang trods disseminering. Dette tilbud om kirurgi eksisterer ikke i Danmark. Med indeværende protokol afprøver vi for første gang denne eksperimentelle kirurgiske behandling til danske patienter. Kombinationen af operativ fjernelse af primærknuden og individualiseret ekstirpation af levermetastaserne, samt perioperativ kemoterapi har kurativt potentiale.

Formål
Vi ønsker at tilbyde intenderet kurativt, radikal kirurgisk behandling til patienter med avanceret ventrikel- eller GEJ-cancer, samt metastasering til lever. Perspektivet er at kunne udvide indikationen for behandling med kurativt sigte.

Materialer og Metoder
Nationalt, multicenter, prospektivt fase-II studie. Alle fire danske centre, der varetager behandling af patienter med ventrikel- eller GEJ-cancer, deltager i studiet. Der inkluderes 20 patienter, som opfylder in- og eksklusionskriterierne. Alle inkluderede patienter vil blive planlagt til at modtage operation for deres primærtumor. Operationen tilrettelægges individualiseret efter scanningsbilleder, og levermetastaser fjernes ved radiofrekvens ablation, operativt eller ved microwave ablation. Der kan dog højst fjernes 30% af det samlede levervolumen. Vanlig perioperativ kemoterapi efter FLOT-regimet.

Resultater
6 patienter er inkluderet, alle centre har inkluderet mindst én patient.

Konklusioner
6 patienter er inkluderet og har gennemgået neoadjuvende kemoterapi (NAC) samt operation. Én patient blev per-operativt fundet non-resektabel. Én patient er progredieret indenfor 6 måneder efter operation med spredning til lymfeglandler

Emerging treatments

#52: High-intensity exercise and thromboembolic events during chemotherapy for testicular cancer: A retrospective analysis from the Body & Cancer cohort

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Abstract
Introduction
Men with testicular germ cell cancer receiving platinum-based chemotherapy have an increased risk of thromboembolic events. A previous randomized controlled trial evaluating the effect of high-intensity interval training prematurely closed due to a perceived added risk of thromboembolic events, as three out of nine participants (33%) in the intervention group developed a thromboembolic event. The primary purpose of this retrospective cohort study was to ascertain the incidence of thromboembolic events in patients receiving chemotherapy for testicular germ cell cancer who had participated in a multimodal exercise intervention, including highintensity interval training (Body & Cancer).

Material and methods
Patients who had participated in Body & Cancer from February 2007 through to February 2020 and had participated in at least one Body & Cancer session were included. Electronic medical records were searched for incident thromboembolic events (primary outcome) during the six-week Body & Cancer interim. Both arterial and venous thromboembolic events during chemotherapy and up to one-year post-chemotherapy were recorded.

Results
In all, 40 men receiving chemotheray for testicular germ cell cancer had participated in Body & Cancer. One of these men (2,5%) experienced a thromboembolic event during participation in Body & Cancer.

Conclusion
Data from the present study do not support previous findings cautioning avoidance of high-intensity interval training due to a possible added risk of thromboembolic events. Considering the potential for positive effects on cardiovascular outcomes associated with high-intensity interval training in other populations, future studies should be performed in men receiving platinum-based chemotherapy for testicular germ cell cancer to confirm these observations.

Palliation and Psychosocial Support: Poster #53-60

Palliation and psychosocial support

#53: The Efficacy And Safety of Medical Cannabis in Patients with Treatment Refractory Cancer-Related Pain: A Retrospective Study

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Abstract
Introduction
Millions of patients suffering from cancer experience pain that interferes with health-related quality of life and daily functioning. Conventional pain-relieving treatment is insufficient in 10-30% of patients with cancer. These patients fall in the category of refractory cancer-related pain, for which medical cannabis may have the potential as a pain-relieving adjuvant analgesic. However, clinical trials have shown conflicting results on the effect of medical cannabis in relieving pain and improving quality of life (QoL). The aim of this study was to investigate efficacy and safety of medical cannabis in the treatment of refractory cancer-related pain.

Materials and methods
This retrospective study analyzed patient records from patients with refractory cancer-related pain treated with medical cannabis administered as THC, CBD, or THC/CBD. The study examined the efficacy of medical cannabis on the following parameters: Pain intensity measured on a numerical rating scale (NRS), patient-reported outcomes of quality of sleep, QoL, and level of functioning. Safety was examined as the occurrence of reported adverse effects. All parameters were assessed at baseline and follow-up.

Results
An interim analysis of 22 patient records has shown that 60% of patients (six patients) prescribed THC/CBD and 50% of patients (two patients) prescribed THC experienced significant reduction of ≥30% in NRS. Generally, quality of sleep was improved in patients prescribed THC or THC/CBD. QoL was improved in all treatment groups. Adverse effects such as dizziness, euphoria, and nausea were mainly associated with THC-containing medical cannabis.

Conclusion
Medical cannabis, predominantly THC-containing, seems to be effective in reducing refractory cancer-related pain, improving QoL, and quality of sleep. The results are preliminary, as additional patient medical records are currently reviewed. Final results and conclusions will be presented at the conference.

Palliation and psychosocial support

#54: Hvordan støtter vi i almen praksis bedst op om kræftpatienter i en socialt sårbar position? En proaktiv indsats i det etablerede system

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Abstract
Introduktion
I sundhedsvæsenet er det en udfordring at hjælpe socialt sårbare patienter godt igennem et kræftforløb. Der er social ulighed i bl.a. rehabilitering og overlevelse efter kræft; en ulighed som er stadig stigende. Patienter i socialt sårbare positioner er ekstra tids- og ressourcekrævende, blandt andet fordi deres livssituation ofte er præget af mangeartede komplekse problemer. Der er derfor et stort behov for at, vi støtter ekstra op om de patienter, som kan have svært ved at navigere i sundhedsvæsenet igennem et kræftforløb. Projektet undersøger hvordan vi, med en praksisnær indsats i almen praksis, bedst muligt støtter op om socialt sårbare patienter med kræft. I projektet udvikles og afprøves en støttemodel på baggrund af en afdækning af de udfordringer og behov der kan opstå I almen praksis i relation til socialt sårbare kræftpatienter.

Metode
Projektet er et kvalitativt studie med inddragelse af fra 8 praktiserende læger i Region Nordjylland, samt 8 socialt sårbare kræftpatienter. Der anvendes individuelle semistrukturerede interviews og workshop, samt udvikling og afprøvning af en konkret og praksisnær indsats i samarbejde med almen praksis.

Resultater
Foreløbige resultater tyder på at praktiserende læger mangler overblik over patienternes kræftforløb og aktuelle situation, hvormed det er en udfordring at være proaktive i forhold til de patienter, som kan have behov for en opsøgende indsats og ekstra støtte. Patienterne gav udtryk for, at de er tilfredse med den støtte de har fået fra sundhedsvæsenet, men også, at de ofte står alene og ikke har kendskab til hvad de kan efterspørge og få hjælp til. Den konkrete indsats som skal afprøves for at imødekomme disse behov og udfordringer er under udarbejdelse, og vil blive præsenteret på kræftforskningsdagene.

Konklusion
Projektet forventes at bidrage med anbefalinger i forhold til hvordan og hvornår almen praksis bedst muligt kan støtte op om social sårbare patienter igennem et kræftforløb.

Palliation and psychosocial support

#55: Compassionate communication and advance care planning to improve end of life care in treatment of hematological disease (ACT) - a cluster randomized controlled trial among patients and caregivers (study protocol)

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Abstract
INTRODUCTION
In order to support implementation of advance care planning and serious illness conversations in hematology, a new conversation intervention “Advance consultations Concerning your life and Treatment” (ACT) has previously been developed and pilot tested. ACT was found to improve patient-caregiver communication regarding wishes for end-of-life, increase empathy and equality in communication from clinicians and help to prioritize in life with serious illness. The interventions effect on quality of endof- life care has not yet been investigated. The aim of the present study is to investigate the effect of ACT conversations on the use of chemotherapy, patients’ and caregivers’ mental health, and the quality of end-of-life care in patients with hematological malignancy. It is hypothesized that ACT will prepare patients and caregivers for difficult end-of-life decisions, decrease the use of futile chemotherapy, and improve the quality of end oflife care.

MATERIALS AND METHODS
The study is designed as a nationwide 2-arm cluster randomized controlled trial randomizing 40 physicians and 80 nurses across seven different hematological departments in Denmark to either standard care or ACT intervention. A total of 400 patients and their caregivers will be included. The ACT intervention includes preparatory material for patients, caregivers, and clinicians, clinician training, ACT conversations, supervision, and organizational changes including dedicated timeslots and templates for documentation. Data will be collected from medical records, patient-reported outcomes, and selfreporting data from clinicians.

RESULTS
The study is currently in its preparation phase. Clinician recruitment will begin in spring 2022 and patient inclusion in fall 2022.

CONCLUSIONS
This study may contribute to bridging the evidence- and practice-gap in end-of-life care and improve the end-of-life experience for patients in hematology and their families.

Palliation and psychosocial support

#56: Attitudes and Experiences Towards Therapeutic Cannabis Among Patients with Prostate Cancer – A Questionnaire Study

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Abstract
Introduction
Patients diagnosed with prostate cancer (PC) can experience pain why some patients seek to relieve cancer-related symptoms through the use of cannabis. However, therapeutic cannabis (TC) is subject to different perceptions among patients. The aim of this survey was to investigate knowledge, experiences and attitudes towards TC amongst patients diagnosed with PC.

Materials and Methods
The participants in this survey were divided into three different questionnaire arms based on their TC history as either experienced (current or former) users or naïve persons. Participants were mainly recruited through the Danish prostate cancer patient association (PROPA), outpatient clinics and social media from December 2021 to March 2022.

Results
A total of 195 respondents with a mean age of 71.5±7.5 years were included, where 20 (10%) were experienced TC users and 175 (90%) were naïve. A significantly lower quality of life (QoL) was found in the experienced users compared to the naïve persons (p=0.027). The experienced users also had significantly lower functional scores in the following domaines: emotional (p=0.011), role (p=0.004), social (p=0.003) and cognitive (p=0.001). More than half of all participants (53%) reported that they believed TC to have a relieving effect on PC-related symptoms. Only 10% of all participants had consulted healthcare providers regarding TC, where a lower proportion was seen among naïve participants (5%) compared to experienced (55%). All experienced participants (100%) acquired TC without prescription. Two-thirds (67%) of all participants would consent to participate in a clinical TC trial if they were invited.

Conclusion
The findings in the survey suggest a lack of dialogue regarding TC between patients with PC and healthcare providers. Participants who were experienced with TC had an overall QoL lower than the naïve participants. In general, the perception of TC was positive among the participants, although only 10% had used it.

Palliation and psychosocial support

#57: Evaluating mindfulness and compassion training as prevention of compassion fatigue among palliative care providers

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Abstract
Background
Healthcare professionals (HCP) at hospices are at risk for developing compassion fatigue (CF) due to numerous emotional demands and recurrent exposure to death and dying. CF results in reduced capacity for caring for patients and relatives and influences the mental health of HCP. Therefore, interventions that prevent CF are recommended, but research about such interventions' effectiveness remains sparse.

Aim
To evaluate an intervention consisting of mindfulness-based stress reduction (MBSR) and compassion training adjusted to hospice workers.

Methods
The mixed method design consisted of questionnaires on stress, resilience and work ability, delivered to 39 participants pre- and post-attendance. This was supplemented with in-depth interviews, focus group interviews and participant observation. All interviews were conducted as semi-structured, recorded and transcribed. The participant observation was documented with handwritten notes transferred to computer.

Findings
20 participants were interviewed twice before and half way through the MBSR and compassion training. The in-depth interviews were supplied with 8 focus group interviews including 38 participants and conducted after finalising the training. The interviews integrated observations from the first, middle and last session of training. The qualitative data was analysed thematically and compared to the themes of the questionnaires. Compassion fatigue was related to stressful events either taking place when encountering patients and relatives, interacting with colleagues or due to emotional challenges at home. When establishing a mindful and compassionate attitude these stressful events were approached differently, resulting in feeling more present and less responsible for others' suffering. Quantitative results are presented when analysed.

Conclusion
The study shows potential benefits of integrating MBSR and compassion training at hospice to prevent compassion fatigue and help build resilience.

Palliation and psychosocial support

#58: May I ask you again? The experience of repeated patient reported outcome measures in palliative care from a patient perspective

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Abstract
Introduction
Since 2010, the proportion of patients answering a patient-reported outcome (PRO) questionnaire, i.e. EORTC-QLQC15-PAL, at admission to specialized palliative care (SPC), has been a quality indicator in the Danish Palliative Care Database. This was expanded with a PRO follow-up indicator (i.e. the proportion answering the same questionnaire 1-4 weeks later). This study aimed to investigate how patients in SPC experience the completion of EORTC-QLQ-C15-PAL at the first and second contact with an SPC unit.

Method
From four SPC units, patients who had their first contact with the unit and had completed the EORTC-QLQ-C15-PAL were asked to participate in two interviews in relation to the first and second contact, respectively. The semi-structured interviews included the following themes: 1) patients' experience when completing the questionnaire for the first time, 2) patients' experience when completing the same questionnaire again, and 3) what motivates/demotivates patients to complete the questionnaires. Interviews were mainly conducted by phone and were recorded, transcribed and analyzed using thematic analysis.

Results
In 2020-21, 15 patients were included in the study (4 males, 11 females). They were 35-89 years old and most had cancer. Eleven patients were interviewed twice and 4 only once. Patients found the EORTC-QLQ-C15-PAL 'relevant and easy to complete', an 'integrated part of SPC' and a 'meaningful status and check list'. Patients were willing to complete EORTC-QLQ-C15-PAL again, however, 'it might be hard to face the health decline'. Patients' main motivation to complete the EORTC-QLQ-C15-PAL was that it was used in their care and treatment and 'not just left in the system'.

Conclusion
Patients in SPC were willing to complete repeated EORTC-QLQ-C15-PAL-questionnaries and found it meaningful if the clinicians use their answers in their care and treatment.

Palliation and psychosocial support

#59: Cancer Patients with Severe Mental Disorders (CASEMED) - Development and pilot test of a Collaborative cancer-SMD care model

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Abstract
INTRODUCTION
Cancer patients with pre-existing severe mental disorders (SMD) including moderate/severe depression, bipolar disorders and schizophrenia are known to have reduced life expectancy. Collaborative care models show promising results of improving cancer care among patients with cancer and SMD. The aim of this new PhD-study is to develop a Danish Collaborative cancer-SMD care model for patients with cancer and pre-existing SMD.

MATERIALS AND METHODS
The intervention will be developed with directions from the Medical Research Council guidelines focusing on development, feasibility, piloting, and evaluation. Through systematic literature search and a yet not published anthropological study barriers at patient-level, provider-level and system-level has been identified. With inspiration from the Bridge Model (led by assistant professor Kelly Irwin) and in context of the COM-B-MODEL the research group are developing a possible cancer-SMD care model. The meaningfulness, feasibility and implementation of the proposed care model will be discussed at a workshop with participating health care professionals from the oncology, psychiatry and primary care sector. After modelling the intervention, a small-scale feasibility test among five patients will be performed and evaluated by patients and participating health care professionals. Subsequently, a pilot test among all SMD-patients with head- and neck, breast, or lung-cancer at AUH for approx. one year will be included and evaluated. Short questionnaires/structured interview with patients, relatives and professionals exploring their views on the intervention will be assessed including PROM questions regarding somatic and psychiatric symptoms and quality of life.

CONCLUSIONS
This study has a high potential to optimize treatment for cancer patients with SMD and hopefully we are able to show, in the future, that the cancer care model can enhance the quality of health care, patient satisfaction and outcome.

Palliation and psychosocial support

#60: Smoking cessation support in a hospital-based healthcare setting: the provider perspective

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Abstract
INTRODUCTION
Tobacco smoking is a major health threat, and smoking cessation support (SCS) is therefore important across all healthcare sectors. However, there has been few attempts to explore the SCS practice from the perspective of internal medicine-, surgery- as well as psychiatry-based healthcare providers (HCPs). Our aim was to explore SCS among various professions of clinical HCPs within an entire hospital.

MATERIALS AND METHODS
A total of 1645 HCPs (mean age: 44.3; mean healthcare experience 17.2 yrs; 85.6% female) at Lillebaelt Hospital, Denmark completed an online survey including questions on how often they 1) assess current smoking status, 2) inform about negative consequences of smoking, 3) advice smoking cessation, and 4) refer to smoking cessation programme. All questions were rated on 5-point Likert scales ('Always'; 'Often'; 'Sometimes'; 'Rarely'; 'Never'). Descriptive statistics were performed.

RESULTS
A considerable proportion (23.6%) of HCPs reported that they never or rarely ask patients about their current smoking status. Moreover, 42.5% reported that they never or rarely tell current smokers of negative effects of smoking, and 40.7% reported that they never or rarely advice smoking cessation. The majority of HCPs (60.7%) reported that they never or rarely refer current smokers to a smoking cessation programme.

CONCLUSIONS
Although smoking is a major health threat, SCS from a broad variety of hospital-based HCPs appears limited. Hospital visits often offers a window of opportunity for the initiation of SCS, and the potential of existing smoking cessation programmes is not fully exploited if eligible patients are not referred.

Patient Involvement:

Poster #61-71

Patient involvement

#61: The SWIM study: Ethnic minority women's ideas and preferences for a tailored intervention to promote national cancer screening programmes—A qualitative interview study

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Abstract
Introduction
Ethnic minority women from non-Western countries are less likely than the native women to participate in screening programmes for cervical cancer, breast cancer and colorectal cancer. This social inequality can result in loss of possibility for prevention, delayed diagnosis and treatment and, ultimately, lower chance of survival. Developing a tailored intervention might be the solution to reduce social inequalities in cancer screening, and a key feature in intervention research is to consult the target group. The study aimed to explore ethnic minority women's own ideas and preferences for a cancer screening intervention and identify their attitudes to different strategies.

Material and Methods
An interview study with five focus group interviews, two group interviews with an interpreter and three individual interviews was conducted. Thirtyseven women from ten non-Western countries contributed to the study. The interviews were audio-recorded and transcribed verbatim followed by a thematic analysis.

Results
According to the women, a tailored intervention should focus on knowledge in the form of face-to-face teaching. The women further suggested information material in their own language with a simple, positive and concrete communication strategy. They would like to be involved in an awareness strategy and share the knowledge with their network.

Conclusion
Ethnic minority women were interested in a tailored intervention, and they were keen to contribute with ideas and preferences. The findings emphasized the potential of a tailored intervention with specific suggestions to the content when attempting to reduce inequality in cancer screening participation in the target group.

Patient involvement

#62: TREATMENT OF SEXUAL DYSFUNCTION AFTER PELVIC ORGAN CANCER

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Abstract
Aims
Studies show that 35-50% of patients with pelvic organ cancer have sexual problems due to the cancer treatment. Despite the high prevalence, sexological treatment has not routinely been part of the Danish cancer rehabilitation program. However, treatment for sexual dysfunctions is now offered systematically at two late-sequelae clinics in Aarhus and Aalborg, where professional sexologists manage the treatment. Aims of the study are to explore the characteristics of the patients referred to the clinics, and to present the set-up and treatment
offered at the clinics.

Materials and Methods
The study is an on-going prospective cohort study. First patient was treated in March 2019.
The treatment is based on a bio-psycho-social approach involving individual- or couple counselling, medication, and sexual aids. The treatment will be evaluated using a merged collection of validated PROMs at baseline and at 3- and 12 months after ended treatment.

Results
Of the 95 referred patients, 91 is so far included in the study. The vast majority was referred from the screening program and most patients were males (78%). Among the included patients, the most frequent cancer diagnosis was rectal cancer (77%), followed by anal cancer (11%). In males, the most prevalent primary problem was erectile dysfunction (86%), and in females, dyspareunia (61%). In both genders, lack of sexual desire was also highly prevalent.

Conclusion
This unique set-up offers professional treatment of sexual dysfunction to patients suffering after pelvic organ cancer. Sexual problems have until recently been unaddressed and not prioritized as part of cancer rehabilitation. This study shows that there is an actual need for treatment, where until now, the majority of referred patients are males. The incoming long-term data enables evaluation of the direct effects of treatment.

Patient involvement

#63: DAHANCA 38 - Systematic use of patient reported outcome during radiotherapy for head and neck cancer (NCT03918382)

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Abstract
Introduction
The national DAHANCA 38 trial compares systematic use of Patient Reported Outcomes (PRO) during radiotherapy (RT) for head and neck squamous cell carcinoma (HNSCC) with standard clinical counselling. The hypothesis is that active use of PRO during RT will lead to improvements in the patients' quality of life, based on more precise monitoring and management of side effects. We here present the protocol and status of inclusion.

Material and methods
The trial is designed as a prospective nation-wide, sequential cohort study, clinicaltrials.gov ID No. NCT03918382, DAHANCA 38 protocol. The study includes patients ≥ 18 years diagnosed with HNSSC and planned for RT (primary or postoperative) at the University Hospitals of Aalborg, Aarhus, Herlev, Naestved, Odense and Rigshospitalet. In the first phase, 97 patients will be included in the control group (standard clinical counselling). In the second phase, 194 patients will be included in the PRO group. The intervention is active use of weekly electronic PRO during RT. The PRO answers will be presented graphically and used as part of the consultation. QoL (EORTC QLQ-C30 and EQ-D5-L5) questionnaires will be answered in both groups at baseline, week 4 of treatment, at completion of RT, and 2 months after RT completion.

Results
The control group have finished inclusion (n=116). In the PRO group, a total of 109 patients have been included per April 19th, 2022. In the PRO group, the male: female ratio is 4:1, and the age group with the highest representation is 60-69 years old. This complies with the general population of HNSCC in Denmark. 871 ePROs have been completed.

Conclusions
Within the DAHANCA collaboration, a national study on active use of PROs during RT for HNSSC has been established. This may generate evidence for the benefit of PROs versus standard counselling during RT. The inclusion rate has been affected by the COVID- 19 pandemic and inclusion is expected to end early 2023.

Patient involvement

#64: Eliciting patient preferences in Shared Decision Making - a qualitative study

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Abstract
Introduction
Eliciting patient preferences is an essential part of Shared Decision Making. Preferences are sensitive to high-stake and uncertain situations, complicating the task of elicitation. This study aims to explore, which linguistic tools and formulations clinicians use, to elicit patient preferences in a clinical encounter.

Materials and methods
The study was performed using a qualitative research design, based on audio recordings of clinical encounters between oncologists and patients.

Results
Eight encounters were included. Four themes emerged: 1) Visual cues: A visualisation of the options provided the patient with a cognitive surplus. 2) Comparison: Making a comparison conceptualized the options, making them more tangible for the patient. 3) “The decision is not final”: Reassuring that a choice is not always definite, lowers the distress of the patient. 4) “Studies show that…”. Presenting information in an unbiased, evidence-based manner, allows for the patient to make a preference-sensitive choice.

Conclusion
The use of visual cues or comparisons can facilitate preference elicitation, along with presenting evidence-based information in an unbiased manner. Practise Implications: To elicit patient preferences clinicians can be recommended to use 1) Visual presentation of options, 2) Comparisons, 3) Alleviate the stress of the patient, and 4) Present information in an evidence-based manner.

Patient involvement

#65: The point of care solution for hematological home monitoring of oncological patients: PixCell HemoScreenTM analyzer applied in a comprehensive study of mamma cancer patients before chemotherapy

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Abstract
Introduction
Bone marrow suppression is a common side effect of chemotherapy requiring regular patient at GP/hospital visits for cytopenia monitoring. We evaluated the feasibility, performance and patients experience of home-testing using the HemoScreenTM instrument.

Materials and methods
The HemoScreenTM WBC performance was verified by comparing WBC results from 32 venous EDTA samples to those of the standard Sysmex XN20 instrument. 33 breast cancer patients assigned to Epirubicin + Cyklofosfamid and Paclitaxel treatment were recruited from the outpatient clinics and taught how to perform capillary finger prick WBC testing. WBC home-testing was performed on the treatment days where reference venous samples were drawn at the hospital.
10 patients were randomly chosen for qualitative interviews about user experiences, impact on treatment and everyday life.

Results
The HemoScreenTM WBCs compared well with the Sysmex reference WBCs. All 33 patients completed the training satisfactory and performed more than 100 home tests (1-5 test/patients) satisfactory. Except for Plts (slope 0.45) the test results compared well with the reference WBCs. The patients expressed being comfortable using HemoScreen for home WBC testing, emphasizing the instrument user-friendliness, importance of being engaged in their own treatment and reduced number of hospital/GP visits as the main benefits.

Conclusion
The setup have made patients capable of performing home WBC monitoring after chemotherapy. Except for Platelets the capillary sample results correlated well with the reference method. Changes in instrument configuration and sampling method are underway to improve Plt testing performance. The patients found the HemoScreen userfriendly; empowering especially those most comfortable in using the technology.

Funding
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Patient involvement

#66: Clinicians view on barriers and facilitators before implementing Shared Decision Making, a Pareto analysis

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Abstract
Introduction
Implementing Shared Decision Making (SDM) in a hospital department requires specific implementation actions. Knowledge of barriers and facilitators will help determine these actions and thus provide stakeholders with key information on where to focus sparse resources. In this quality improvement project, we investigated factors with greatest potential impact on improvement on SDM, before an implementation process of SDM.

Methods
A Pareto analysis is a statistical technique in decision-making used to select a limited number of tasks that produce a significant overall effect. The Pareto analyses were carried out using an electronic questionnaire. We asked doctors, nurses and other clinical staff to consider qualitative statements on barriers and facilitators related to implementing SDM. The qualitative statements were based on research of SDM barriers and facilitators. We then pooled data from the questionnaires and displayed them in a frequency plot.

Results
Eight Pareto analyses were carried out in 4 specialities across 4 hospitals in Denmark. In all, 263 respondents took part in the Pareto analysis. Overall, the “vital few” facilitators were “We have patients and patient courses suited for SDM”, “We are used to working with patient involvement” and “My colleagues have knowledge of SDM”. The “vital few” barriers were “I need knowledge and teaching”, “I need decision-aids” and “My patients gets insecure”.

Discussion
Results indicate a need for knowledge. Meanwhile, a facilitator was that one’s colleagues have knowledge of SDM. This states the importance of putting together the right implementation team to support the process of implementing SDM.

Conclusion
The Pareto analysis provides an insight into which barriers and facilitators, according to the clinicians, were the “vital few”. Focusing on these factors, can lead an SDM implementation process towards actions with greatest impact.

Patient involvement

#67: A qualitative, single center study on thoughts about infertility in female adolescents and young adults with cancer during their cancer course and in survivorship

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Abstract
Introduction
Yearly, 900 female adolescents and young adults (AYAs) aged 15-39 are diagnosed with cancer in Denmark. Continuing advances in cancer therapy entail an increase in long-term survival. One consequence of cancer therapy is the risk of infertility. The purpose of this study was to explore the thoughts of female AYAs with cancer regarding infertility.

Materials and methods
This explorative study was approved 1.st of September 2020 by the local Data Protection Agency (P-2020-849). The study was carried out from September 2020 to March 2021 at 'Kræftværket', the youth support centre and social organization for AYAs with cancer at the University Hospital of Copenhagen, Rigshospitalet. Inclusion criteria were female cancer patients and survivors aged 18-39. Twelve individual semi-structured qualitative interviews were performed with AYAs aged 20-35 with cancer, exploring the expectations prior to and after cancer treatment regarding family planning and their concerns and thoughts about infertility. Data was analysed using thematic analysis, rooted in a phenomenological approach.

Results
Four main themes were found: The women's hope of having children in the future is strong; The women need to clarify the wish for children very quickly, but they must wait a long time to get pregnant; The women need to make existential and ethical choices about survival and family formation; and The women lose control of their bodies.

Conclusions
Results indicate that female AYAs with cancer often have thoughts including loss of body control and existential dilemmas regarding survival versus preserved fertility. The expectance of becoming pregnant is reduced to hope. The long waiting time before being allowed to try to become pregnant leads to distress and concerns, which AYAs often carry alone.

Patient involvement

#68: Shared decision making on radiation dose for stereotactic body radiotherapy of malignancies located less than 1 cm from the thoracic wall – A randomized trial

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Abstract
Introduction
Lung cancer is prevalent with more than 4,600 new cases in Denmark each year. Limited stage disease is often treated with curative intent with stereotactic body radiation therapy, where the tumor is irradiated with a high dose during a few treatment days. The physician sometimes reduce the dose to lower the risk of side effects, though this dose reduction may result in less tumor control, often without asking the patient for their preference. Shared Decision Making (SDM) is a collaboration between patient and clinician taking into account both the newest medical evidence and the patients' values, preferences, life situation and knowledge of disease and prognosis. In this study we will involve the patients in the decision of high (66 Gray) or lower (45 Gray) radiation dose or no radiation treatment at all and test our newly developed Patient Decision Aid (PtDA). The PtDA is a set of paper cards showing pros and cons for the different treatment options and based on a generic template from our Center for Shared Decision Making.

Materials and Methods
We are conducting a randomized, controlled, unblinded study with 40 patients. We randomize the patients to having the consultation with the physician with or without the PtDA. The primary outcome is the extent of SDM behavior of this audiotaped consultation by means of OPTION 12 scoring by two independent reviewers. We also study differences of patient reported SDM with a range of SDM measurement tools, quality of life questionnaires and physician assessed side effects after the treatment.

Results
Inclusion began in November 2021 and will last for 18 months. We have enrolled three patients so far.

Conclusions
We expect to see an increased extent of SDM in the consultations with the PtDA. This study might pave the way for a broader utilization of SDM in radiation therapy. We will present possible preliminary results and the PtDA at the conference.

Patient involvement

#69: CONNECTion - Involvement and collaboration with a patient advisory board throughout the research phases

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Abstract
Introduction
Involving patients at all stages of the research process is desirable, but limited knowledge exists. The involvement and collaboration of patients are beneficial and can improve quality, significance, clinical outcomes, and impact. Women with ovarian- and endometrial cancer have unmet needs related to information and aspects of their disease. In a PhD study, CONNECT, patient involvement is embedded throughout all research phases.

Materials and methods
A patient advisory board involving women with a history of ovarian- or endometrial cancer has been recruited through a closed online network group under the auspices of the Danish patient association for women with gynaecological cancer (Kræft I Underlivet). Participation in the advisory board is based on volunteering and national virtual meetings are held continuously every 2-3 months.

Results
A patient advisory board consisting of (n=9) women constitute the board named CONNECTion. The recruitment of women for the board took place over seven weeks and until now six meetings have been held in one year. The board contributes with feedback on written materials, development of the research, and capturing the perspectives of women with ovarian- and endometrial cancer. Further, the board has been dedicated and constructive in a systematic process leading to the selection of cancer-specific items, self-management strategies, content, and videos to be represented in a future ePRO platform.

Conclusions
Involvement, engagement, and collaboration of a patient advisory board during the research phases are highly valuable and make a significant contribution to conducting patient-oriented and patient-centered research.

Patient involvement

#70: Patient-led follow-up with the use of digital care guide to increase self-management in rectal cancer patients

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Abstract
Introduction
Recent studies concerning patient-led follow-up have shown positive effect on rectal cancer patients' management of symptoms and timely reporting of clinical symptoms. This project's main task is to transfer each of the steps in the patient's follow-up pathway into a digital care guide, which will provide the patients with an overview of the complete follow-up pathway. The digital care guide will in addition contain educational material regarding common long-term sequelae and signs of cancer recurrence, instructions on how to manage and react adequately to these symptoms, and how to contact the healthcare system.

Materials and Methods
The follow-up pathway for rectal cancer patients will be transferred into a digital care guide, using the platform "Emento" which delivers a digital care guide for the health care system. The content will be based on a previously developed analogue educational session used in a randomised trial, including long-term sequelae (physical and psychological) and signs of recurrence. A digital symptom guide will be introduced for the patients at the initiation of follow-up and be available throughout follow-up. The guide will provide information on how to self-manage symptoms, and where to take contact if needed. In addition, the patients will have access to unrestricted self-referral to a clinical nurse. Relevant stakeholders will be involved in developing the digital care guide, including patients, doctors, nurses and secretaries.

Results
The development of the digital care guide is initiated in May 2022, followed by a feasibility study, measuring participation rate, quantity and patterns of digital activities, knowledge, patient experienced barriers and facilitators, self-management, fear of recurrence and health literacy in 50 rectal cancer patients.

Conclusions
If successful, the present study will immediately be advantageous to both the patient's and to the society by improved self–management and patient satisfaction.

Patient involvement

#71: BREAST-Q som Elektroniske Patient-reported Outcome Measures til kvinder diagnosticeret med brystkræft – Hvem er deltagerne? Et kvantitativt deskriptivt studie

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Abstract
Introduktion
Der er evidens for, at aktiv anvendelse af Patient-reported Outcome Measures (PROMs) i klinisk praksis kan fremme person-centreret pleje og behandling samt forbedre patienters helbredsrelaterede livskvalitet. Kvinder, der diagnosticeres med brystkræft har ofte fysiske og psykosociale følger af behandlingen, som påvirker deres helbredsrelaterede livskvalitet. Der mangler endnu viden om potentialet ved anvendelse af PROMs i klinisk praksis under brystkirurgiske forløb. I 2021 introducerede Plastik- og Brystkirurgisk Afdeling på Sjællands Universitetshospital elektroniske PROMs (ePROMs) til kvinder, der diagnosticeres med brystkræft. Formålet med dette studie er 1) at undersøge demografiske karakteristika på patienter som deltager i ePROMs; 2) at analysere deltagernes ePROMs og skabe viden til videre implementering af ePROMs.

Materialer og Metoder
Dette kvantitative studie er en del af et igangværende multimetode feasibility studie om implementering af ePROMs i Plastik- og Brystkirurgisk Ambulatorium. Patienterne udfylder ePROMS via REDCap. Studiet inkluderer analyse af det første års data efter introduktion af ePROMs. I analysen undersøges demografiske variable for alle patienter, der inviteres til forløb med ePROMs samt foreliggende ePROM-data på deltagere. Analysen bliver beskrevet ved deskriptiv statistik samt lineære regressionsmodeller til at identificere, hvilke demografiske variable, der er forbundne med sub-skala scores fra BREAST-Q spørgeskemaet.

Resultater
Studiet har for nuværende 306 ePROM-deltagere. I alt forventes ca. 700 patienter inkluderet frem til september 2022. Præliminære data inklusiv deltagerprocent og missing data vil blive præsenteret på Danske Kræftforskningsdage i august 2022.

Konklusioner
Dette studie vil generere anvendelsesorienteret viden til videre implementering af ePROMs i en Plastikkirurgisk- og Brystkirurgisk kontekst. Studiet kan resultere i anbefalinger for brug af ePROMS i klinisk praksis for denne population.

Personalised Medicine, Biomarkers & Diagnostics: Poster #72-88

Personalised medicine, biomarkers & diagnostics

#72: Can a radiographer perform MRI rectal tumor angulation - an interobserver reliability study

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Abstract
Introduction
Typically when rectal tumors are examined using magnetic resonance imaging (MRI) the perpendicular angulation of the axial T2-weighted image to the tumor axis is essential to perform a correct measurement of the shortest distance between the tumor and meso-rectal facia. The aim was to determine the interobserver reliability in rectal tumor angulation between a radiologist and a radiographer.

Material and Methods
Independently, two observers performed the angulation. The MRI scans were performed using an MRI 1.5 Tesla unit. Bland–Altman plot was used to assess the interobserver variance and Intraclass correlation coefficient (ICC) statistic was used to assess the interobserver reliability.

Results
A total of 55 patients with rectal cancer were included. A total of 25 (45.5%) females and 30 males (54.5%). The median age was 71 years (range 46–87 years). The rectal tumor mean length was 3.9 cm. The interobserver reliability was good (ICC = 0.83, 95% confidence interval 0.72–0.90).

Conclusion
Radiographers receiving training will be able to perform MRI rectal tumor angulation.

Personalised medicine, biomarkers & diagnostics

#73: Natural Killer cells activity and detection of lung cancer

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Abstract
Introduction
Natural killer (NK) cells play an essential role in the immune response against cancer. However, immune escape mechanisms may cause inferior NK cell activity (NKA) in cancer patients. This prospective study examined the relationship between NKA and lung cancer in a high-risk cohort.

Materials and methods
250 participants were referred from their general practitioner on suspicion of lung cancer. Ahead of clinical investigation, blood was collected into NK Vue tubes, and level of IFNγ after 24 hours served as a surrogate marker for NKA.

Results
79/250 were diagnosed with lung cancer. No significant difference in NKA was found between lung cancer patients and participants where lung cancer was ruled out (i.e. controls) (median 226 pg/mL vs. 450 pg/mL, p=0.08). However, there was a significant difference in NKA when comparing patients with stage III-IV lung cancer and controls (median 161 pg/mL vs. 450 pg/mL; p<0.01).

Conclusions
NKA is not suitable for lung cancer screening as a single biomarker. The significant lower NKA in stage III-IV lung cancer patients encourages further investigation combining NKA with other biomarkers and examine a potential role of NKA as marker of disseminated disease.

Personalised medicine, biomarkers & diagnostics

#74: NK cell activity and methylated HOXA9 ctDNA as prognostic biomarkers in patients with non-small cell lung cancer treated with PD-1/PD-L1 inhibitors

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Abstract
Background
PD-1/PD-L1 inhibitors have greatly improved survival for a fraction of patients with non-small cell lung cancer (NSCLC), but better prognostic biomarkers are needed.

Methods
Plasma was prospectively collected from 71 patients with NSCLC before initiating treatment with PD-1/PD-L1 inhibitors and before treatment cycles 2-4. We used the NK Vue assay to measure the level of interferon gamma (IFNg) as a surrogate for NK cell activity (NKA). Methylated HOXA9 circulating tumor DNA (ctDNA) was measured by droplet digital PCR.

Results
Patients were classified according to NKA at the available time points. Median OS was 170 days (95% CI 110-285 days) for the NKA-low group (n=29), 487 days (95% CI 361-761 days) for the NKA-mixed group (n=34), and 1,131 days (95% CI 235 days to not reached) for the NKA-high group (n=13, p<0.001). Patients were divided according to detectable ctDNA after one treatment cycle. Median OS was 235 days (95% CI 170-525 days) for the ctDNA+ group (n=41) and 544 days (95% CI 361-1158 days) for the ctDNAgroup (n=32, p=0.007). A score combining NKA and ctDNA status measured after the first treatment cycle had a strong prognostic impact. Group 1 had an abnormal level of IFNg (<250 pg/mL) and detectable ctDNA (n=27), group 2 had either abnormal levels of IFNg and undetectable ctDNA or normal levels of IFNg and detectable ctDNA (n=29), and group 3 had normal levels of IFNg (>250 pg/mL) and undetectable ctDNA (n=15). Median OS was 221 days (95% CI 121-539 days), 419 days (95% CI 235-650 days), and 1,158 days (95% CI 250 days to not reached), respectively (p=0.002). Biomarker score 1 was a marker of poor prognosis with a hazard ratio of 5.560 (95% CI 2.359-13.101, n=71, p<0.001) when adjusting for PD-L1 status, histology, and performance status.

Conclusion
A biomarker score combining NKA and ctDNA after the first cycle of treatment may be used to stratify the prognosis in patients with NSCLC treated with PD-1/PD-L1 inhibitors.

Personalised medicine, biomarkers & diagnostics

#75: Pharmacological targeting of epithelial-to-mesenchymal transition in non-small cell lung carcinoma

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Abstract
Introduction
Non-small cell lung cancer (NSCLC) represents an enormous health problem in Denmark (highest world rate in women according to WHO). The introduction of novel drugs has recently improved the scenario, but the patients' prognosis in many cases is still dismal because the drugs fail to prevent the metastatic spread. Hence, the development of novel targeted therapeutic for lung cancer is urgently needed. Epithelial to mesenchymal transition (EMT) is a developmental cellular program that determines the aggressiveness of tumors by causing metastasis and chemoresistance. Despite its importance in cancer, EMT has so far never been successfully targeted by any drug available for cancer therapy.

Methods and Results
By large-scale transcriptomics and analysis of metabolic pathways in cancer, we found that EMT can be inhibited by metabolites belonging to the class of short chain fatty acids, like propionate. These are non-toxic small metabolites produced by our commensal microbiota, and therefore potentially very interesting for therapeutic use. Treatment of human lung cancer cell lines with sodium propionate (SP) 1) increased the expression of epithelial markers, 2) reduced their metastatic ability once injected in immunedeficient mice, and 3) sensitized the cells towards cisplatin, backbone for cytotoxic chemotherapy in advanced-stage patients. RNAsequencing and validation experiments on SP-treated cells preliminarily indicated chromatin remodeling via histone acetylation as the mechanism behind EMT attenuation. Additional work to understand the role of lung microbiota on the EMT status of lung cancer cells is currently ongoing in vitro and in NSCLC tissue samples.

Conclusions
This class of metabolites could be tested for chemoprevention of metastasis and for breaking EMT and chemotherapy resistance. Targeting EMT could have important potential implications in reducing the devastating effects of aggressive NSCLCs.

Personalised medicine, biomarkers & diagnostics

#76: The diagnostic value of circulating cell-free HPV DNA in plasma from cervical cancer patients

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Abstract
Introduction
Circulating cell-free HPV DNA (ccfHPV DNA) may serve as a marker for cervical cancer.

Materials and methods
In this study, we used the sensitive digital droplet PCR (ddPCR) method to detect and quantify ccfHPV DNA in plasma from patients with HPV16 or HPV18 associated cervical cancer. Here, blood samples from 60 patients diagnosed with cervical cancer (FIGO IA1-IVA) at Aarhus or Odense University Hospital (June 2018 to March 2020) were collected prior to treatment. These patients were subdivided into an early-stage subgroup (n=30) and a late-stage subgroup (n=30) according to disease stage. Furthermore, blood samples from eight women with HPV16/18 associated premalignant conditions (CIN3) and 15 healthy controls were collected. ddPCR was used to analyze plasma from all participants.

Results
ccfHPV DNA was detected in 19 late-stage patients (63.33%), three early-stage patients (10.00%), and none of the CIN3 patients or controls. Quantitative evaluation showed significant correlations between ccfHPV DNA level and stage, tumor score, and tumor size.

Discussion
Our results indicate that ccfHPV DNA may not be a useful marker for early detection of cervical cancer. However, for patients with advanced stage cervical cancer, ccfHPV DNA level represents a promising tool to establish tumor burden, making it useful for establishing treatment response and monitoring the disease.

Personalised medicine, biomarkers & diagnostics

#77: Multiomics detect potential mechanisms of resistance to BRAF targeted therapy in patients with BRAF V600E mutated solid tumors

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Abstract
Introduction
The purpose of this study was to identify mechanisms of resistance to BRAF targeted therapy using genomics, transcriptomics and proteomics in patients with BRAF V600E mutated solid tumors.

Materials and Methods
Nine patients with BRAF V600E mutated advanced solid tumors were included. Patients were treated with BRAF targeted therapy (BRAF inhibitor + MEK inhibitor and/or anti EGFR antibody). Tumor biopsies at baseline and progression were analyzed with whole exome sequencing (WES), RNA sequencing (RNAseq) and mass spectrometry-based proteomics. We used a filtering process when analyzing the expressed proteins; we included proteins involved in pathways where BRAF is also involved AND had the highest shift in abundance between baseline and progression.

Results
Patients were treated until progression of disease. At time of progression we identified alterations conferring resistance in two out of nine patients from WES and RNAseq data: one patient with a PTBP2-BRAF fusion and one with a NRAS mutation. Genomic alterations conferring resistance could not be found in the remaining seven patients.
From the proteomics data, we could not find a single protein shared between all nine patients. However, when comparing protein overlap on pathway level, six pathways related to RAF and MAPK signaling were altered in all nine patients. One of these pathways, paradoxical activation of RAF signaling, where formation of RAF dimer structures happens as a response to treatment with BRAF inhibitors, seems to be a particularly interesting candidate to explain resistance.

Conclusion
With a multiomic approach, potential mechanisms of resistance to BRAF targeted therapy were detected in all nine patients at disease progression. Six mechanisms were shared independently of diagnosis and treatment regime. The potential to integrate proteomics with genomics and transcriptomics is promising and may guide therapy for patients with treatment resistant BRAF V600E mutated solid tumors.

Personalised medicine, biomarkers & diagnostics

#78: Circulating microvesicles and exosomes in small cell lung cancer by quantitative proteomics

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Abstract
Introduction
Small cell lung cancer (SCLC) is an aggressive type of lung cancer that affects more than 700 individuals in Denmark yearly. Most patients are diagnosed with advanced disease, and no blood-based test for early diagnosis exists. This study hypothesizes that tumor-derived proteins circulating in the blood of SCLC patients can be used as diagnostic markers.

Materials and methods
Plasma samples were collected from 24 SCLC patients at diagnosis and from 24 healthy individuals. Microvesicles and exosomes were isolated from the samples using high-speed- and ultracentrifugation. The protein content in the microvesicles and exosomes was investigated using mass spectrometry.

Results
We identified 16 microvesicular proteins and 17 exosomal proteins that were differentially expressed in the patients compared to healthy individuals (fold change ≥ 2 or ≤ 0.5 and AUC ≥ 0.70; $p < 0.05$). Among these, coagulation factor XIII A was significantly downregulated (Log2 fold change = - 1.1, $p = 0.0003$) and complement factor H-related protein 4 was significantly upregulated (Log2 fold change = 1.2, $p = 0.0005$). These two proteins suggested excellent discrimination between SCLC patients and healthy controls (AUC = 0.82).

Conclusions
Several proteins were differentially expressed between SCLC patients and healthy individuals, showing that microvesicles and exosomes may encompass specific proteins with potential diagnostic attributes for SCLC. Coagulation factor XIII A, which is known to play an important role in neoplasms, and complement factor H-related protein 4, which is not previously described as upregulated in any cancers, were differentially expressed, indicating dysregulated blood coagulation and complement activation in SCLC. In an on-going larger prospective study, we aim to validate these findings.

Personalised medicine, biomarkers & diagnostics

#79: Pretreatment albumin-to-alkaline phosphatase ratio is a prognostic marker in lung cancer patients. A registry-based study of 7,077 lung cancer patients

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Abstract
Introduction
The albumin-to-alkaline phosphatase ratio (AAPR) is a new promising prognostic marker in cancer patients. However, the evidence for its value in lung cancer is scarce. Therefore, we evaluated the prognostic value of the AAPR in a large group of lung cancer patients.

Material and methods
Data on lung cancer patients diagnosed from January 2009 to June 2018 were extracted from the Danish Lung Cancer Registry and combined with data on the pretreatment serum AAPR level extracted from the clinical laboratory information system. The AAPR tertiles were used as cut-offs. Cox proportional hazard models assessed the prognostic value of AAPR.

Results
In total, 5,978 non-small cell lung cancer (NSCLC) patients and 1,099 small cell lung cancer (SCLC) patients were included. Decreasing AAPR was significantly correlated to decreasing median overall survival (OS) in NSCLC patients (medium vs low AAPR: adjusted HR=0.73 (95% confidence interval (CI): 0.68-0.79); high vs low AAPR: adjusted HR=0.68 (95% CI: 0.62-0.73)) and in SCLC patients (medium vs low AAPR: adjusted HR=0.62 (95% CI: 0.52-0.74); high vs low: adjusted HR=0.59 (95% CI: 0.50-0.70)).

Conclusion
The AAPR was an independent prognostic factor in NSCLC and SCLC patients. The correlation seems to be leveldependent, with decreasing survival found for decreasing AAPR levels.

Personalised medicine, biomarkers & diagnostics

#80: IFNλ1 is a STING-dependent mediator of DNA-damage and induced Immune Activation in Lung Cancer

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Abstract
Introduction
Initiating an immune response is vital for clearing tumors. One key pathway is the cGAS-STING-pathway which initiates immune responses after sensing of cytosolic DNA induced by DNA-damaging agents. The release of type I IFN is as a standard marker for STING pathway activation, but type III IFN - IFNλ is also induced by STING-signaling and important in controlling viral infections. Despite the relevance of IFNλ, its contribution to immune activation in cancer remains unclear.

Material and methods
STING expression and pathway activation was explored in NSCLC cell lines by analyzing WB, qPCR and ELISA following DNA transfection or treatment with chemotherapy. Selected cell lines were also investigated by transcriptomic profiling. To investigate the effect of STING-induced cytokines on immune cells primary human macrophages was stimulated with IFNλ and induced gene expression was analyzed using RNA-sequencing. In addition, primary macrophages stimulated with IFNλ was grown in co-culture with CD8+ T-cells and cytokine production was analyzed with ELISA and Flow Cytometry.

Results
We found large varying expression patterns of proteins involved in the cGAS-STING pathway. However, cytokine expression downstream of cGAS-STING activation, identified IFNλ1 as a broad mediator of STING activation in all NSCLC cancer cells lines upon DNA stimulation and chemotherapy treatment, whereas only few induced type I IFNs. Treating macrophages with IFNλ1, resulted in upregulation of a broad range of interferon stimulated genes and functional changes that increased activation of autologous CD8+ Tcells, succeeding elevated production of IFNγ and Granzyme B.

Conclusion
We here demonstrates that IFNλ1 is a strong and broad marker of STING activation induced by chemotherapy in NSCLC; and IFNλ1 has the ability to prime a broader immune response by targeting macrophages. In the context of the tumor microenvironment such response may potentially be supportive to immunotherapy.

Personalised medicine, biomarkers & diagnostics

#81: Potential targeted therapies in ovarian cancer

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Abstract
The knowledge of molecular and clinical aspects underlying high grade serous ovarian cancer (HGSC) has enabled the possibility of exploiting targeted therapies. We characterized the mutational profile of 128 HGSC patients to identify potential targeted therapies. Clinical data were obtained from the Danish Gynecological Database and tissue samples were collected through Danish CancerBiobank. DNA was analyzed using NGS (Oncomine Comprehensive panel). 47 (37%) patients were platinum-sensitive, 32 (25%) partially platinum-sensitive, 35 (27%) platinum-resistant, 3 (2%) platinum-refractory and 11 (9%) patients did not receive chemotherapy. 12 (26%) platinum-sensitive patients had druggable targets for PARP inhibitors treatment, one for tyrosine kinase inhibitor and one for immunotherapy treatment. 8 (25%) partially platinum-sensitive patients had druggable targets: 7 eligible for PARP inhibitors and one potential eligible for alpesilib and hormone therapy. 7 (20%) platinum-resistant patients had druggable targets: 6 (86%) potential eligible for PARP inhibitors, one for immunotherapy and one for erdafitinib. No druggable targets were found in platinum-refractory patients or patients who did not receive chemotherapy. Studies investigating possible targeted therapies should be considered as there may be an unexplored area for especially platinum-resistant patients, according to our molecular findings. However, this presupposes that platinum-resistance proves to be not decisive for PARP inhibitors.

Personalised medicine, biomarkers & diagnostics

#82: Actionable Molecular Alterations Are Revealed in Majority of Advanced Non-Small Cell Lung Cancer Patients by Genomic Tumor Profiling at Progression after First Line Treatment

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Abstract
Introduction
Genomic profiling in advanced Non-Small Cell Lung cancer (NSCLC) can reveal Actionable Molecular Alterations (AMAs). Our study aims to investigate clinical relevance of re-biopsy after first line treatment, by reporting on acquired and persistent AMAs and potential targeted treatments in a real-time cohort of NSCLC patients.

Materials and methods
Patients with advanced NSCLC receiving first-line treatment were prospectively included in an observational study (NCT03512847). Genomic profiling was performed by TruSight Oncology 500 HT gene panel on tumor tissue collected at diagnosis and at time of progression.

Results
The 92 patients re-biopsied at progression had received immunotherapy (n=44), chemotherapy (n=44), or combination treatment (n=4). In 87 of these patients (95%), successful genomic profiling was performed at both the diagnostic biopsy and the rebiopsy. In 74 patients (85%), ≥1 AMA were found. The AMAs were acquired in 28%. The most frequent AMAs were observed in TP53 (45%), KRAS (24%), PIK3CA (6%), and FGFR1 (6%). Only five patients (5%) received targeted treatment mainly due to deterioration in performance status.

Conclusions
Re-biopsy at progression revealed acquired AMAs in approximately one third of patients, and 85% had at least one AMA with the potential of receiving targeted treatment, thus strengthening the clinical relevance of re-biopsy.

Personalised medicine, biomarkers & diagnostics

#83: Loco-regional failure is associated with the stem cell marker SLC3A2, volume and HPV/p16 in HNSCC

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Abstract
Introduction
Large tumor volume and HPV/p16- status are known to be poor prognostic factors for loco-regional failure for Head and Neck Squamous Cell Carcinoma (HNSCC) after primary curative radiotherapy (RT). However, the response to RT is heterogeneous and the objective was to identify the presence and possible impact of the stem cell marker SLC3A2.

Material and methods
Patients (Pts) in the study represented a subgroup of the DAHANCA 19 study. Pts were treated with primary RT 66-68Gy, 33-34fx, 6 fx/wk; concomitant weekly cisplatin (40mg/m2) if UICC stage III/IV (7th ed.) and the hypoxic radiosensitizer nimorazole. Tumor tissue were collected and dissected and sufficient amount of cancer tissue was ensured. RNA was extracted and qPCR was applied to measure the gene expression of the cancer stem cell marker SLC3A2. Volume of GTV-T and -N (GTVTot) was extracted from the original planning-CT. p16-status was evaluated with immunohistochemistry with a cut-off of 70 %. Subclassification was performed according to HPV/p16-status, 50-percentile of SLC3A2 (high/low) and GTVTot (large/small) into three predefined groups. Applying deformable image registration between planning-CT scans and scans conduced upon failure allowed for detection of failures that was located in the high-dose region. High-dose failure served as endpoint in survival analyses.

Results
Full data-set were available from 477 primary tumors. When dividing pts into the three predefined groups, the risk of high-dose failure was significantly worse for tumors with large volume, HPV/p16 negative status and high SLC3A2 compared to tumors with low volume, HPV/p16 positivity and low SLC3A2, $p<0.001$. In total, 6 % of the pts in the low risk-group (n=69) and 33 % in the high-risk group (n=51) had failure in the high-dose region.

Conclusion
Together with tumor volume and HPV/p16, SLC3A2 is a poor prognostic factor. Therefore, SLC3A2 may be a putative marker of radioresistance in primary RT of HNSCC.

Personalised medicine, biomarkers & diagnostics

#84: The genetic landscape of metastatic breast cancer reflected in circulating tumor DNA

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Abstract
Introduction
Tissue biopsies of breast tumors only provide a snapshot of the evolution of the disease and may miss potential therapeutic targets, especially in the metastatic setting. Plasma-derived cell-free tumor DNA constitutes a potential surrogate for tumor DNA obtained from tissue biopsies to potentially capture inter-and intra-tumoral heterogeneity present in metastatic breast cancer.

Methods
We performed whole-exome sequencing on tumor DNA from primary and metastatic lesions and plasma-derived circulating tumor DNA of eight patients with metastatic breast cancer.

Results
We obtained average sequencing depths of 231x, 08x, and 513x in the primary tumor, metastases, and ctDNA. Our results show that metastases most often follow parallel evolution, given the low levels of stem mutations detected between primary tumors and matched metastases and mutational events private to the primary tumor. Furthermore, we demonstrated that ctDNA mainly reflected old stem mutations shared between primary tumor and metastasis, and less often, genetic alterations found solely in primary tumor or metastasis. Lastly, clinically relevant variants, e.g., resistance mutations detected in primary tumor and metastasis, were to some extent reflected in ctDNA, including affected genes MET, MTOR, CDK6, PIK3CA, and GATA3. However, mutations in MED1, NCOR1, and NCOR2 were only found in tumor tissues. These findings support the importance of a metastatic deposit biopsy to guide treatment decisions.

Conclusions
Together, our results have implications for future ctDNA studies. For monitoring tumor burden using ctDNA, our results suggest that truncal mutations are the best candidates, as they are highest in circulating levels. For confident tracking of subclonal mutations in ctDNA, liquid biopsies are not yet to substitute metastatic tissue biopsies and instead demonstrate support to the current gold standard.

Personalised medicine, biomarkers & diagnostics

#85: Natural Killer cell activity before and after larger abdominal surgery: A comparison of colon cancer and ventral hernia

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Abstract
Introduction
Natural killer (NK) cells are subset of lymphocytes with antitumor capabilities. Surgical stress results in significant reduction in NK cell cytotoxicity, which has been linked to postoperative cancer metastases. It is not known whether this suppression of NK cells differs between patients undergoing cancer surgery and patients undergoing surgery for benign disease. This study aims to describe NK cell activity (NKA) in two cohorts undergoing laparoscopic surgery for either colon cancer or ventral hernia.

Materials and Methods
We collected peripheral blood in NKVue tubes at five time points in patients undergoing laparoscopic operation for either colon cancer stage I-III (n=30) or ventral hernia (n=9) preoperatively, on postoperative day (POD) 1, 3-5, 10-15, and approximately 90 days after the intervention. The level of interferon-gamma (IFN-γ) was measured in the plasma as a surrogate marker for NKA after 24 hours of incubation at 37°C.

Results
The two cohorts did not differ regarding preoperative NKA (p=0.22); cancer cohort median 1134 pg/mL (95% CI 429-1839) versus control cohort median 1074 pg/mL (95% CI 201-1947). Patients with right sided tumors tended to have lower NKA preoperatively, IFN-γ median 145 pg/mL (95% CI 105-458) (n=10), compared to left sided, IFN-γ median 537 pg/mL (95% CI 146-2117) (n=20), p=0.06. On the first postoperative day, the NK cell activity had decreased significantly in both groups and was significantly lower in the cancer patients (p=0.002) (median 32 pg/mL (95% CI 32-32)) compared to the control group (median 138 pg/mL (95% CI 32-362)). In the cancer group, the NKA at day 90 was significantly higher than preoperatively (p=0.006), median 2240 pg/mL (95% CI 1265-3214) and 1134 pg/mL (95% CI 429-1839), respectively.

Conclusion
The results support immunosuppression after major surgery. Study in larger cohorts is needed to search correlation in colon cancer and the potential of NK cell therapy in the perioperative period.

Personalised medicine, biomarkers & diagnostics

#86: Utility of host-cell DNA methylation for risk-stratification of women aged ≥45 referred for colposcopy

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Abstract
Introduction
The performance of colposcopy is often impaired in older women as the transformation zone (TZ) retracts into the cervical canal, making sampling difficult and increasing risk of underdiagnosis. We have recently shown that more than 50% of highgrade lesions (CIN2+) in older women with TZ3 are missed if relying on biopsies only. Thus, there is a need to explore the use of biomarkers for risk-stratification, to reduce risk of underdiagnosis and overtreatment. Host-cell DNA methylation is a new and promising molecular biomarker, which has been shown useful for triage of HPV-positive women in screening. This study aimed to evaluate the clinical utility of DNA-methylation markers for risk-stratification of women ≥45 referred for colposcopy.

Materials and Methods
We conducted a cross-sectional study in colposcopy clinics in Central Denmark Region during 2019–2021.
Women were eligible for enrolment if they were aged ≥ 45 years, referred for colposcopy due to an abnormal screening result, and had a TZ3 at colposcopy. 96 women were included. Each woman had a cervical sample collected for HPV and cytology testing, followed by four colposcopy-directed biopsies, and a diagnostic cone biopsy. The residual material from the cervical sample was analyzed using a new panel of methylation markers and the MeD-seq technique at Methylomics, The Netherlands. Cone biopsy results were collected from the Danish Pathology Databank. We calculated the sensitivity and specificity of methylation markers for CIN2+ detection using the result of the cone biopsy as reference standard.

Results
We are currently awaiting the final methylation results and expect to be able to present our results at the meeting.

Conclusion
If host-cell DNA methylation has a high sensitivity and specificity for CIN2+ detection, the marker may be useful for riskstratification moving forward, allowing targeted treatment of women at high risk while allowing women at low risk to undergo followup.

Personalised medicine, biomarkers & diagnostics

#87: Danish National Molecular Tumor Board. History, current status, organization and future perspectives

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Abstract
Introduction
Precision medicine (PM) based on molecular profiling (MP) is becoming increasingly important for matching patients (pts) with marketed therapies or clinical trials. As MP has evolved from immunohistochemistry to extensive whole genome DNA sequencing, RNA sequencing, chromosomal aberrations (CAs) and proteomics, the requirements for analysis, interpretation and clinical application have increased likewise, requiring a national, multidisciplinary approach.

Material and Methods
The Danish National Molecular Tumor Board (DN-MTB) was established in 2019 as a cooperation between Danish oncologic centers. DN-MTB was preceded by the MTB at Rigshospitalet established in 2013. DN-MTB's purpose is to provide advice on targeted treatment options and facilitate referral to clinical trials based on the presented MP.
First established in 2013 at Rigshospitalet, as a multidisciplinary collaboration, the MTB was held biweekly, weekly from September 2019, with attendance of oncologists, molecular biologists and bioinformaticians and with pathologists, clinical geneticists, and oncological pediatricians also in regular attendance. The MTB became national in 2018 with inclusion of centers in Aarhus in April and Herlev in October. Subsequently, centers in Odense, Aalborg, Vejle and Region Zealand have been included in the DN-MTB totaling 7 centers. An average of 23 persons attended each meeting in 2022.

Results
The average weekly number of MPs discussed at DN-MTB have steadily increased from 0.5 in 2013, 1.5 in 2014, 3.5 in 2015, 5.5 in 2016, 7 in 2017, 18 in 2019, 22 in 2020, 27 in 2021 and 28 in 2022 (by April 2022). By 2022 most MPs include data from whole exome/genome somatic DNA sequencing, CAs, RNA expression and sequencing whilst a minority are based on large commercial gene panels.

Conclusion
With the increase in pts undergoing MP, increasing data volume per MP and expanding therapeutic options for pts, the DN-MTB is expected to play a pivotal role in PM.

Personalised medicine, biomarkers & diagnostics

#88: The DBCG RT Nation study: A big data analysis of guideline implementation in Danish breast cancer radiotherapy

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Abstract
Introduction
The risks of side effects and recurrence after radiotherapy (RT) for high-risk breast cancer (HRBC) are corelated to the dose distribution contained in individual treatment plans. In Denmark, national guidelines exist on how to delineate organs and distribute dose. However, no large-scale investigation on how these guidelines are being followed has been made. The aim of the study is to investigate the effects of national guideline changes on the volume and planned RT dose of the heart and internal mammary lymph nodes (IMN) for all Danish patients with HRBC treated from 2008 -2016.

Materials and methods
We identified 8.900 patients with HRBC from the DBCG database. Automatic solutions for collecting and curating RT treatment data were implemented in the seven Danish RT departments. The volume and dose for the heart and IMN over time for each department was evaluated in relation to three events: 2010-2012: National delineation workshops (E1). 2014: IMN irradiation introduced for left-sided (LS) treatments (E2). 2015, New delineation guidelines published (E3).

Results
HRBC treatment data were analysed for 7000 patients. All patients with right sided (RS) HRBC had IMN delineated. All patients with LS HRBC planned after 2014 (E2) had IMN delineated.
The average volume of both heart and IMN stabilised around 2011 (E1). In 2015, the average volume for IMN decreased, indicating a change in delineating practice, caused by E3. The mean heart dose (MHD) for LS HRBC decreased from 2008 to 2013 because of an increase in heart volume and introduction of gating. In 2014 (E2) the intention to treat IMN for LS HRBC lead to an increase in MHD. Overall, the LS HRBC had a lower IMN V90% than the RS HRBC, because of constraints to the heart dose.

Conclusion
The effect of the three investigated events on the volume and dose parameters can be detected nationwide. We conclude that there is a clear effect of the national guidelines on the clinical RT planning practice.

Screening:

Poster #89-95

Screening

#89: Working collaboratively with vulnerable women to identify the best implementation gains by screening cervical cancer more effectively in European countries: CBIG-SCREEN, EC Horizon 2020

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Abstract
Background
Though cervical cancer screening programmes drastically reduce cervical cancer mortality, they rarely reach the subgroups at highest risk, adding to the challenges vulnerable populations already face in their efforts to maintain their physical health. This EU-funded 5-year project, CBIG-SCREEN, aims to tackle inequality in the cervical cancer continuum, from prevention to follow-up, by creating a Europe-wide knowledge framework around barriers to cervical cancer screening.

Method
In this study, we will be working collaboratively with stakeholders on several levels including vulnerable women themselves, to identify the interventions that will more effectively engage and retain them in cervical cancer screening programmes. The methods include 1) surveys to map current cervical cancer policies and stakeholders (institutions, healthcare providers, and vulnerable women at high risk of cervical cancer), and 2) involvement of these stakeholders in Collaborative User Boards which are managed by facilitators in seven countries: Romania, Estonia, Portugal, Denmark, Bulgaria, France, and Italy, and 3) development of a model (Stakeholder Engagement Tool) for involvement of stakeholders on several levels in healthcare interventions.

Results
Data from the surveys and from the Collaborative User Boards will be ready for presentation by August 2022.
Conclusion: The study intends to offer support to policymakers and national programmes to help Europe reach or exceed the WHO 2030 target of screening >70% of women for cervical cancer. This will reduce health inequality by increasing screening ratios among vulnerable women from 26% to 45%, equivalent to saving 6,000-7,000 lives per year.

Screening

#90: The impact of pre-notifications and reminders on participation in colorectal cancer screening – a randomised controlled trial

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Abstract
Introduction
Organised colorectal cancer (CRC) screening has been implemented in many countries, most of them applying a twostaged invitation procedure with an invitation and one reminder. Even so, they suffer from sub-optimal participation rates limiting the effectiveness of the programmes. This study aimed to analyse if participation in CRC screening could be increased by combining the standard invitation procedure with pre-notification and/or extra reminder(s).

Material & Methods
The study was designed as a randomised controlled trial nested in the Danish CRC screening programme employing the faecal immunochemical test. Groups I and II received three-staged invitation procedures (pre-notification, invitation and one reminder; and invitation and two reminders, respectively). Group III received a four-staged invitation procedure (prenotification, invitation and two reminders). The control group received the two-staged invitation procedure.

Results
Overall participation rates ranged from 66.9% in the control group and 67.5% and 68.7% in the two three-staged invitation procedures (pre-notification and second reminder, respectively) to 69.8% in the four-staged invitation procedure ($p<0.001$). The three-staged invitation procedures increased the participation rate by 0.6 (95% CI: -0.5 to 1.7) when a pre-notification was added to the existing invitation procedure and by 1.8% (95% CI: 0.7 to 2.9) when a second reminder was added. The four-staged invitation procedure increased the overall participation rate by 2.9% (95% CI: 1.8 to 4.0). In the age group 50-59 years, the four-staged invitation procedure increased the participation rate by 4.0% (95% CI: 2.4 to 5.6).

Conclusions
Implementing the four-staged invitation procedure increased participation and is simple and inexpensive. However, receiving extra reminders might be disturbing for some. Deciding to include pre-notifications and reminders (or not) should be based on consideration of this delicate balance.

Screening

#91: The development of a stakeholder engagement tool

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Absact
Background
This study forms a part of CBIG-SCREEN which is an EU funded 5-year project aiming to increase cervical cancer screening uptake for vulnerable subgroups. Despite increasing recognition of patient and public involvement in healthcare research, some subgroups remain inaccessible. This impedes gaining important perspectives in order to reduce inequality in access to healthcare services. Though cervical cancer screening programmes drastically reduce cervical cancer mortality, they rarely reach the subgroups at highest risk, adding to the challenges vulnerable populations already face in their efforts to maintain health.

Method
In this study, the aim was to develop a tool for involvement of different stakeholders in cervical cancer screening including subgroups of vulnerable women. The methods included 1). Development of collaborative user boards in Romania, Estonia, Portugal, Denmark, Bulgaria, France, and Italy to work collaboratively with stakeholders on several levels, to identify the interventions that will more effectively engage them in cervical cancer screening programmes 2). Development of a workshop to prepare the facilitators managing collaborative user boards. 3). Monthly on-line meetings with facilitators. 4). Conduction of three collaborative user board meetings throughout the project in each country. Preliminary results: Data from the workshop and the first collaborative user board meetings in the seven countries have been obtained and the analysis is ongoing and will be ready for presentation by August 2022.

Conclusion
The study intends to offer a stakeholder engagement tool to be used in any cancer screening research setting aiming to include the perspectives of different stakeholders including and with specific regards to vulnerable subgroups.

Screening

#92: Khorana score to stratify risk of venous thromboembolism in non-small cell lung cancer patients undergoing stereotactic body radiation therapy

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Abstract
Introduction
Venous thromboembolism (VTE) is a frequent complication in patients with lung cancer, associated with increased mortality and morbidity and decreased quality of life. The Khorana score is a clinically-validated tool to assess the risk of VTE in outpatients with cancer during chemotherapy, however, no risk evaluation tool exists for patients receiving radiotherapy. This study aims to examine if the Khorana score can stratify risk of VTE in a population of patients with localized non-small cell lung cancer (NSCLC) treated with stereotactic body radiotherapy (SBRT).

Materials and Methods
From October 2018 to April 2021, 105 T1-T3N0M0 patients diagnosed with NSCLC and treated with SBRT at Odense University Hospital were enrolled in a prospective single-institutional study investigating the impact of SBRT on the coagulation system. Baseline Khorana score ≥2 was considered high risk of VTE. VTE events were evaluated using patient medical records and defined as deep venous thrombosis or pulmonary embolism verified by either ultrasonography or computed tomography.

Results
The potential median follow up was 23.5 months (range 9.8-34.5). A total of 59 patients (56%) had a Khorana score <2 and 46 patients (44%) had a Khorana score ≥2. Five events of VTE (4.5%) were observed (four had a Khorana score <2 and one had a score ≥2). The Khorana groups or groups of VTE or non-VTE did not differ in baseline characteristics. No significant differences were found in overall survival between VTE and non-VTE groups (p=0.90). Khorana score had a positive predictive value of 2%, was not predictive of VTE events in receiver operating characteristic curve analysis (area under the curve 0.63, 95% CI 0.42-0.83), and showed no association with VTE events in multivariate analysis (0.14, 95%CI -2.68-2.97, p-value 0.92).

Conclusion
Khorana score did not stratify patients at highest risk of VTE in this small population of SBRT treated patients with localized NSCLC.

Screening

#93: Mammography screening participation in Denmark during the COVID-19 pandemic

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Abstract
Introduction
In most countries, mammography screening programmes were paused at the early phase of the pandemic. Contrarily, in Denmark mammography screening continued throughout the pandemic. We examined the mammography screening participation during the COVID-19 pandemic in Denmark in comparison with the previous years.

Methods
We included all individuals aged 50-69 years and invited to participate in mammography screening from January 2015 to September 2021. Information on invitation and participation was retrieved from the Danish Quality Database for Mammography Screening, while information on socio-economic factors were retrieved from Statistics Denmark. Using a generalised linear model and adjusting for age, we estimated prevalence ratios (PR) of mammography screening participation within 90, 180 and 365 days since invitation during the pandemic in comparison with the previous years.

Results
Compared to the pre-pandemic period, fewer women participated in mammography screening within 90 days during pre-lockdown (PR=0.85; 95% CI: 0.84-0.86) and 1st lockdown (PR=0.94; 95% CI: 0.93-0.95). A slighter reduction was seen in mammography screening participation within 180 days and 365 days during pre-lockdown (PR=0.93; 95% CI: 0.92-0.93 and PR=0.94; 95% CI: 0.94-0.95) and 1st lockdown (PR=0.96; 95% CI: 0.95-0.97 and PR=0.97; 95% CI: 0.96-0.98). Women living alone and women with the lowest income still had a slightly lower participation in mammography screening from 1st re-opening and onwards.

Conclusions
Participation in mammography screening was reduced during the early phase of the pandemic, especially for participation within 90 days. Women living alone and women with a low income had a slightly lower participation throughout the pandemic. Efforts are needed to ensure that all women resume mammography screening participation at the aftermath of the pandemic.

Screening

#94: Cervical cancer screening participation in Denmark during the COVID-19 pandemic

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Abstract
Introduction
In contrast to most of the world, the cervical cancer screening programme in Denmark continued throughout the COVID-19 pandemic. We examined the cervical cancer screening participation during the pandemic in Denmark.

Methods
From the Cervical Cancer Screening Database, we included all women aged 23-64 years old, who were invited to participate in cervical cancer screening from 1 January 2015 to 30 September 2021, and linked it to population-wide registries in Denmark. Using a generalised linear model, we estimated prevalence ratios (PR) and 95% confidence intervals (CI) of cervical cancer screening participation within 90, 180 and 365 days since invitation during the pandemic in comparison with the previous years. All analyses were adjusted for age, year and month of invitation.

Results
In total, 2,220,000 women aged 23-64 years old were included in the study. Before the pandemic, 35% of women participated in screening within 90 days, 55% participated within 180 days and 65% participated within 365 days. Compared to before the pandemic, fewer women participated in cervical cancer screening within 90 days when invited during pre-lockdown (PR=0.58; 95% CI: 0.56-0.59) and 1st lockdown (PR=0.76; 95% CI: 0.75-0.77). A slight reduction in cervical cancer screening participation within 180 days was also seen during pre-lockdown (PR=0.89; 95% CI: 0.88-0.90) and 1st lockdown (PR=0.92; 95% CI: 0.91-0.93). Allowing for 365 days to participation almost no reduction in the overall participation was observed; however, some groups of women (age 40-49 and 60-64 years old, low education and low income) still had a slightly lower participation.

Conclusions
The overall participation in cervical cancer screening was reduced during the early phase of the pandemic resulting in a longer time to participation. However, some groups of women had a lower participation even with a long follow-up and it is important to ensure that these women re-enter the screening programme.

Screening

#95: Colorectal cancer screening participation in Denmark during the COVID-19 pandemic

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Abstract
Introduction
In contrast to the rest of the world, the colorectal cancer (CRC) screening programme remained open throughout the COVID-19 pandemic in Denmark. We examined the CRC screening participation and the compliance with colonoscopy in Denmark throughout the pandemic.

Materials and methods
We used data from the Danish Colorectal Cancer Screening Database among individuals aged 50-74 years old invited to participate in CRC screening from 1 January 2018 to 30 September 2021 linked to population-wide registries. Using a generalised linear model with robust standard error we estimated prevalence ratios (PR) and 95% confidence intervals (CI) of CRC screening participation within 3 months since invitation and overall compliance with colonoscopy within 2 months since a positive immunochemical faecal occult blood test during the pandemic in comparison with the previous years adjusting for age, month and year of invitation.

Results
We included 3,145,729 invitations in 1,938,703 individuals. The participation in screening was 61% before the pandemic. The participation was reduced during pre-lockdown (PR=0.95 (95% CI: 0.94-0.96)) and 1st lockdown (PR=0.85 (0.85-0.86)), whilst the participation was 5%-10% higher than usual in the remaining part of the pandemic (e.g. PR=1.10 (1.09-1.10) during 2nd lockdown). Nonetheless, in the sub-group of first-time participants, the pattern was the reverse (e.g. PR=1.06 (1.03-1.09) during 1st lockdown & PR=0.73 (0.72-0.75) during 2nd lockdown). Before the pandemic, the compliance with colonoscopy was 90%. A minor reduction was observed during 1st lockdown (PR=0.95; 95% CI: 0.93-0.97), where after it resumed to normal levels.

Conclusions
Overall, a slight reduction in participation in CRC screening during the early phase of the pandemic in Denmark was observed, followed by increases in participation during the re-opening and subsequent lockdowns among all invited. Yet, the pattern was reverse in the subgroup of first-time participants.

Morbidity, late effects & rehabilitation: Poster #96-108

Morbidity, late effects & rehabilitation

#96: Rehabilitering er afgørende - behovsvurdering af personer med kræft i accelererede udredningsforløb

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Abstract
Årligt registreres ca. 45.000 nye kræfttilfælde i Danmark. Flere personer overlever og lever længere med kræft end tidligere, hvorfor der er et stigende behov for på vurdering af funktionsevne og behov for rehabilitering. I "Forløbsprogram for rehabilitering og palliation i forbindelse med kræft" fremgår det, at hospitalerne forpligter sig til systematisk at vurdere patientens behov for rehabilitering tidligst muligt efter diagnosetidspunktet. Et studie om udbredelsen af behovsvurdering både regionalt og kommunalt viste, at 78% af patienterne ikke modtog en behovsvurdering, mens en afdækning af 14 hospitalsafdelinger viste, at behovsvurderingen kun var integreret på 4 afdelinger. I Klinik for Medicinsk Udredning (KMU), Diagnostisk Center, Regionshospitalet Silkeborg udføres diagnostiske pakkeforløb for patienter med uspecifikke symptomer på sygdom, der kunne være kræft. Årligt udredes ca. 700 patienter i KMU, hvoraf 12-15% får en kræftdiagnose. Indsatsen i KMU har rettet sig mod diagnostiske udredning og mindre grad mod funktionsevne og rehabilitering.
Formålet er at afprøve og evaluere et nyt fysio- og ergoterapeutisk arbejdsområde i form af en behovsvurdering af patienter med nydiagnosticeret kræft.

Materiale og metode
Dette praksisudviklingsprojekt gør brug af Triple Aim-tilgangen. Der indgår ca 40 patienter fra KMU, der diagnosticeres med kræft. De modtager en fysio- eller ergoterapeutisk behovsvurdering på 30 min. få dage efter diagnosticering. Der gennemføres kvalitativ interview af 6 deltagere mhp. deres oplevelse af behovsvurderingen, tidspunkt for vurdering, anvendelighed af skema samt om de har påbegyndt rehabilitering. Kvantitativt data indsamles på demografi, andel der ønsker behovsvurdering og rehabiliteringstilbud der henvises til.

Resultater
Projektperiode okt. 2021- aug. 2022. Resultater kan præsenteres på konferencen.

Konklusion
Projektet vil danne baggrund for beslutning om yderligere justering, skallering eller nedlæggelse af indsatsen.

Morbidity, late effects & rehabilitation

#97: Påvirker udviklingen af svært mesenterielt traktions syndrome langtidsoverlevelsen efter kirurgi for kræft i spiserøret eller ventriklen

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Abstract
Introduktion
Mesenterielt traktionssyndrom (MTS) er defineret som forekomsten af blodtryksfald, pulsstigning og ansigtsrødme indenfor de første 15-20 minutter af større abdominal kirurgi. MTS inddeles i tre sværhedsgrader: ingen, moderat og svær MTS ved at bruge graden af ansigtsrødme. Under større åben abdominal kirurgi udvikler ca. 35 % af patienterne svær MTS. Svær MTS er forbundet med øget postoperativ morbiditet og øget risiko for at udvikle svære postoperative komplikationer. Både øget postoperative morbiditet og svære komplikationer er i store studier vist at være forbundet med dårligere langtidsoverlevelse efter større kræftkirurgi. Det er dog aldrig blevet undersøgt hvordan udviklingen af svær MTS påvirker langtidsoverlevelsen efter større abdominal kirurgi. Dette studie undersøges 5-årsoverlevelsen i to kohorter, bestående af patienter som fik foretaget åben operation for hhv kræft I spiserøret og i mavesækken, hvor alle patienter intraoperativt har fået vurderet deres sværhedsgrad af MTS.

Materialer og metoder:
Tooghalvfems patienter som fik foretaget åben operation for kræft i hhv spiserør eller mavesæk mellem 2013 til 2016 blev inkluderet. Patienterne fik intraoperativt vurderet sværhedsgraden af MTS. Patienternes blev undersøgt for om evt. dødsdato og evt. dato for recidiv. Derudover blev data omkring onkologisk behandling og cancersygdom registreret. Patienter som udviklede svær MTS bliver sammenlignet med patienter som ikke udviklede svær MTS.

Resultater
Ingen resultater er klar endnu, men forventes klar i juni måned 2022.

Konklusion
Studiet bliver det første til at undersøge langtidseffekten af svær MTS efter større abdominal kræftkirurgi.

Morbidity, late effects & rehabilitation

#98: E-learning in Cross-sectorial Cancer Rehabilitation

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Abstract
Introduction
More people survive cancer and have a special need for rehabilitation, which should be managed across sectors in the healthcare system. Using an e-learning programme, information is available to patients whenever they have the need for it or feel motivated to explore and learn. If relatives use the same platform, e-learning becomes a valuable and shared source of knowledge. However, the experience and knowledge outcome of using e-learning rehabilitation programmes in people with cancer and their relatives have only been scarcely studied.

Purpose
Using the existing e-learning programme 'Life with and after cancer' as a case, the purpose is to explore if and how an elearning platform can strengthen cross-sectorial rehabilitation and support patients' and relatives' management of daily life challenges during and after cancer treatment.

Method
The project employs mixed qualitative methods: initial interviews combined with ethnographic observation while patients and relatives navigate the e-learning programme and individual in-depth research interviews. Moreover, focus group interviews with healthcare professionals from hospital and municipalities will gain insight into their use of and referral to the e-learning programme.

Results
Knowledge from the project will support development and organization of future cancer rehabilitation initiatives in an internet-based context, elucidating the experience of use and potential barriers to e-learning. Given the cross-sectorial anchoring of the project, the project aspires to develop new models and strategies for e-learning in cancer rehabilitation that may be implemented broadly across the Danish Regions.

Morbidity, late effects & rehabilitation

#99: Is singing training a feasible rehabilitation modality for patients with lung cancer after intended curative treatment? - a study protocol

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Abstract
Introduction
Patients with lung cancer have persistently reduced quality of life (QoL), decreased psychological well-being, reduced social activity, and, often, comorbidities. The recommended follow-up programme for patients with non-small cell lung cancer (NSCLC) after intended curative therapy includes rehabilitation. However, there is no standardised offer available, specifically targeting patients with lung cancer. Singing training has previously demonstrated physiological training effects1 in patients with chronic obstructive pulmonary disease, and may improve respiratory control, dyspnoea, QoL, and anxiety and depression, but effects have not yet been investigated in lung cancer.

Materials & Methods
We plan to map the current rehabilitation offer and, subsequently, to conduct a feasibility study with 10 weeks' singing training after curative NSCLC therapy. Besides objective outcomes such as walking distance and lung function, we will investigate effects on physical activity, QoL, symptoms burden (e.g. pain, cough, nausea, dyspnoea, dysphonia), health care visits, hospitalisations, and drug prescriptions. Moreover, we will conduct a qualitative study about living with lung cancer and about the experience of singing together with peers.

Results & Conclusions
We expect that singing training supports and strengthens physiological and psychological parameters, relieves symptom burden, and, moreover, may break the vicious circle of loneliness, isolation, and hopelessness which many people with lung diseases – including patients with lung cancer – experience. The study may create a basis for a subsequent full-scale randomised controlled trial. 1. Use of Singing for Lung Health as an alternative training modality within pulmonary rehabilitation for COPD: an RCT. M. Kaasgaard, D. Bech Rasmussen, K. Hjerrild Andreasson, O. Hilberg, A. Løkke, P. Vuust, U. Bodtger. European Respiratory Journal Jan 2021, 2101142; DOI: 10.1183/13993003.01142-2021

Morbidity, late effects & rehabilitation

#100: Quality of life by Patient Reported Outcomes in patients with locally advanced rectal cancer receiving modern neoadjuvant radiotherapy

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Abstract
Introduction
Patient-reported outcome measures (PROM) are valuable for patient-centred information and evidence-based recommendations. This study reports quality of life (QoL) and specific symptoms measured by PROM after modern radiotherapy (RT) for locally advanced rectal cancer (LARC).

Materials and methods
Patients with LARC were included from 2017-2021 in a prospective study. IMRT/VMAT was delivered as short-course (SCRT), 25Gy/5F or long-course (LCRT), 50.4Gy/28F RT ± concomitant capecitabine. PROMs were collected prior to RT (PT), at end of RT (EOT), preoperatively (PO) and at one-year follow-up (1Y) using validated questionnaires EORTC QLQ-C30 and -CR29. PROMs were assessed according to EORTC guidelines and raw symptoms reported as frequencies of scores 3-4 (quite a bit-very much).

Results
110 patients were included, 91 received LCRT and 19 received SCRT. Median age was 67 years and 69 % were performance status (PS) 0. Patients in PS 2 received SCRT more frequently. Completion of PROMs ranged from 84.5% at PT, 73.6% at EOT, 71.8% at PO to 71.8% at 1Y. Global Health Status/QoL mean scores at PT was 64.9 and significantly declined at EOT, 57.4. Scores improved at PO, 66.7 with a trend to further increase at 1Y, 69.1. The same pattern applied to the functional scales: physical-, role-, and social functioning and symptom items pain and fatigue. The most frequently reported raw gastrointestinal scores at PT were buttocks/rectal/anal pain (27%), blood in stool (30%), and diarrhoea (26%) which significantly improved at 1Y. Patients receiving SCRT reported significantly lower Global Health Status/QoL at EOT compared with LCRT-but no differences were observed for the reported raw symptoms. Of patients completing questionaries at 1Y, 80% had stoma with the highest reported item being embarrassment of stoma (16%).

Conclusion
Global Health Status/QoL and functional scales deteriorated at EOT and were restored already at PO with a trend for further improvement at 1Y.

Morbidity, late effects & rehabilitation

#101: Fatigue and Quality of Life in Patients with Neuroendocrine Neoplasia

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Abstract
Introduction
Neuroendocrine Neoplasms (NEN) are rare tumours, often arising in the gastro-intestinal tract or lungs. Poor health related quality of life (HRQoL) is associated with the carcinoid syndrome (CS) caused by NEN, and cancer related fatigue is also of significant importance to these patients. We aimed to quantify HRQoL and fatigue in out-patients with NEN.

Methods
In a cross-sectional study, we included 231 patients with NEN (G1-G3). We used pre-validated questionnaires MFI-20, EQ-5D-5L and 85% of patients responded. We collected clinical, biochemical, imaging and pathology data from the Electronic Patient files. Normative values for fatigue and HRQoL derived from background populations were used for comparisons.

Results
Patients' median age was 68 years (range 21-91) and 52% were male. Patients with NEN reported significantly more fatigue and worse HRQoL compared to the background population ($p<0.05$). Cured patients reported higher self-reported HRQoL than patients with current disease, and patients with high grade neoplasms (G2-G3) reported more anxiety and depression compared to patients with low grade G1 disease ($p<0.05$). The carcinoid syndrome resulted in a relative loss in Quality Adjusted Life Years of 9%, compared to patients with no CS. ($p<0.05$). More than 50% of patients with CS reported problems with usual activities, pain/discomfort, and anxiety/depression. Overall, 36% of patients with NEN were fatigued with psychological fatigue in 92% of these patients. Younger patients (<65 years) experienced more fatigue than older patients ($p<0.05$).

Conclusion
Patients with NEN report significantly lower HRQoL and more fatigue compared to the background population. Especially, patients with CS had problems with pain, discomfort, anxiety, and depression and a relative reduction in HRQoL. However, in comparison to other cancer types, patients with NEN experience relatively less fatigue.

Morbidity, late effects & rehabilitation

#102: Bile acid malabsorption in patients with chronic diarrhoea following right-sided hemicolectomy for colon cancer

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Abstract
Introduction
A proportion of colon cancer survivors treated with right-sided hemicolectomy have documented long-term bowel dysfunction, including chronic diarrhoea, urgency and faecal incontinence, affecting their quality of life. The underlying causes are unknown. The aim of this study was to investigate the aetiology of chronic diarrhoea among colon cancer survivors treated with right-sided hemicolectomy.

Materials & Methods
Cases with chronic diarrhoea (Bristol stool type 6-7) after right-sided hemicolectomy were compared to a control group of rightsided hemicolectomy patients without diarrhoea. All participants underwent a selenium-75 homocholic acid taurine (SeHCAT) scan to diagnose bile acid malabsorption (BAM). A glucose breath test was performed to diagnose small intestinal bacterial overgrowth (SIBO). Fibroblast Growth Factor (FGF) 19 was measured in fasting blood in a subgroup of patients. In addition, gastrointestinal transit time was measured in all participants.

Results
In total, 45 cases and 19 controls were included. In the case group, 82% had BAM compared with 37% in the control group, P <0.001. SIBO was diagnosed in 73% of patients with chronic diarrhoea as well as in 74% of the control patients. No association between BAM and SIBO was observed. Median (interquartile range) FGF19 was 90.7 (67.9-135.8) pg/ml in cases and 93.9 (78.1-115.0) pg/ml in controls, P = 0.894. There was no association between SeHCAT retention and FGF19. Gastrointestinal transit time was similar in cases and controls.

Conclusions
Right-sided hemicolectomy patients with chronic diarrhoea had a higher frequency of BAM than controls, indicating that BAM plays an important role in the bowel dysfunction seen after colonic resection for right-sided colon cancer. No association was found between chronic diarrhoea and bacterial overgrowth. Since BAM was frequently found in patients without diarrhoea, further studies are needed.

Morbidity, late effects & rehabilitation

#103: Patient and caregiver-reported outcome measures during the first 9 months of follow-up care after curative surgery for cancers in the pancreas, bile ducts or duodenum

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Abstract
Introduction
Cancers of the pancreas, duodenum and bile ducts all share a poor prognosis. Extensive surgery is the only viable cure, however the five-year survival rate remains low. When treatment with adjuvant chemotherapy has ended the patients are offered follow-up care up to two years after surgery. As these cancers are characterised by rapid disease progression and a high symptom burden the follow-up care is rather complex.

Aim
The primary study aim was to assess HRQOL, anxiety and depression in patients and caregivers during the first nine months followup care. The secondary aim was to assess the levels of dyadic coping in patients and caregivers and further to assess the burden of being a caregiver during follow-up care.

Materials and Methods
From 276 eligible patients, 104 patients and 74 caregivers were included in a prospective cohort in the period from March 2017 to July 2020. Clinical data was collected from the patients' journal and demographics were collected at baseline (when attending follow-up care) and at nine-months follow-up. Patients answered following questionnaires at baseline, after six and nine months; EORTC QLQ C30/PAN26 for patients with cancer in the pancreas (n=76), in the duodenum (n=11) and BIL21 in the bile ducts (n=19). Anxiety and depression in patients and caregivers were assessed by the Generalized Anxiety Disorder and the Patient Health Questionnaire. QOL in caregivers was assessed by EQ-5D, and their burden was assessed by Zarit Caregiver Burden questionnaire. Finally, the dyadic coping between the patient and their caregiver was assessed by the Dyadic Coping Inventory.

Conclusions
The results are pending, and we expect them to identify implications for health-care delivery.

Morbidity, late effects & rehabilitation

#104: Chronic pain after colon cancer surgery: Translation and validation of a scoring system

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Abstract
Introduction
Chronic pain after colon cancer surgery remains underexplored. The lack of a validated tool for measuring chronic pain in these patients comprise a major problem, as such an instrument is crucial to produce evidence of incidence, prevalence and risk factors. The Chronic Pain Score (CP Score) was originally developed on data from Danish rectal cancer patients. The aim of the present study was to translate and validate the CP Score in a cohort of colon cancer patients.

Materials and methods
Danish CRC survivors diagnosed between 2001 and 2014 completed the CP Score and two measures of quality of life (QoL). Clinical data was obtained from a national database. Convergent validity was explored by testing the CP Score's association with a single ad hoc QoL item and the EORTC QLQ-C30, discriminative validity by testing the score's ability to differentiate between gender and age groups, and sensitivity/specificity by determining the score's ability to identify patients with major impact of pain on QoL.

Results
Responses from 7,127 colon cancer patients were available for analyses. Convergent validity was confirmed as the score was significantly associated with both measures of QoL ($p<0.001$). Also, the score was able two differentiate between males/females and older/younger patients ($p<0.001$), reflecting a high discriminative validity. In addition, the score was able to identify patients with major impact of pain on QoL, with a sensitivity of 87 % a specificity of 82 %.

Conclusion
The CP score may be considered a valid tool for measuring chronic pain after colon cancer surgery.

Morbidity, late effects & rehabilitation

#105: Clinical implementation of proton therapy for testicular seminoma. Comparison of robust intensity modulated proton and photon plans

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Abstract
Introduction
Radiotherapy for seminoma has traditionally been done with photons. The extent of the target results in a substantial dose bath to surrounding organs at risk (OAR). The patients are young with excellent prognosis so reducing the risk of secondary cancer is of utmost importance. Before clinical implementation a comparative dose planning study was done to determine if robust optimized intensity modulated proton therapy (IMPT) could reduce dose to OAR.

Materials and Methods
Six patients treated with photons (3 field IMRT, n=4 or 2 arc VMAT, n=2) were used for comparative dose planning. CTV-E (Elective) were standard dog-leg. Prescribed dose ranged from 20–25 Gy RBE to CTV-E. Pathological lymph nodes were subsequently boosted to 10 Gy RBE. Proton plans used 5 field-robust IMPT planning for the CTV-E (3 posterior supplemented by 2 anterior fields). Dose to OARs (body, bowel bag, bladder, spinal cord, duodenum, kidneys, pancreas, stomach) where compared for photon vs. proton plans. The risk of secondary cancer was calculated according to Schneider et al. Wilcoxon's signed rank test was used for comparison ($p<0.05$).

Results
Mean doses to all OARs were significantly lower with protons except for comparable doses to spinal cord, due to the posterior beams and pancreas for one patient. For left and right kidney, a reduction from 4.9 Gy to 3.3 Gy and 4.7 Gy to 2.6 Gy ($p=0.03$; $p=0.03$) was seen, respectively. Mean dose to body outline was reduced from 3.9 Gy to 1.9 Gy ($p=0.03$). The excess absolute risk (EAR) of secondary cancer was reduced from 46 to 23 per 10.000 persons per year for photon vs. proton plans ($p=0.03$), but with considerable variation between IMRT and VMAT, as VMAT resulted in a higher EAR.

Conclusions
Mean dose to all OARs were reduced with protons compared to photons except for spinal cord and pancreas and thereby resulting in a reduced risk of secondary cancer. Robust IMPT is now implemented as a standard treatment for patients with seminoma.

Morbidity, late effects & rehabilitation

#106: Skeletal muscle change among patients with cancer undergoing chemotherapy, immunotherapy, or a combination: a systematic review and meta-analysis

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Abstract
Introduction
Skeletal muscle loss is a common cancer-related symptom and is associated with physical decline, poor quality of life, treatment-related complications and reduced overall survival. Nevertheless, changes in skeletal muscle during treatment with chemotherapy and immunotherapy have not yet been systematically evaluated.

Materials and methods
We systematically searched PubMed, EMBASE and Web of Science for observational studies with at least two assessments of skeletal muscle in patients with cancer separated by period of treatment with chemotherapy or immunotherapy. The searches were performed on February 1st, 2022. Study selection, data extraction and risk of bias (RoB) evaluation were done independently by two reviewers. RoB was evaluated using NIH Quality Assessment Tool for Observational Cohort and Crosssectional Studies. Random effects meta-analyses using the restricted maximum-likelihood estimator with Hartung-Knapp adjustment were used to quantitatively synthesize data. Continuous outcomes are reported as standardized mean differences (SMD) with 95 % confidence intervals (CI).
PROSPERO ID CRD42022308388.

Results
Eighty-one studies across ten cancer sites comprising 8298 patients were included. The average time between the two assessments of skeletal muscle was 3 months. In a preliminary analysis across all cancers and treatments including 25 studies and 2185 participants, we found a decline of skeletal muscle (SMD -0.26, 95% CI -0.32 to -0.20, P = 0.04) during the period of treatment. Further analyses are ongoing and will be reported at ECRS.

Conclusions
This work indicates a loss of skeletal muscle during chemotherapy or immunotherapy. Given the adverse outcomes associated with less of skeletal muscle mass, there is a need for future studies exploring interventions (nutrition or/and exercise) during treatment with chemotherapy or immunotherapy, to prevent loss of skeletal muscle.

Morbidity, late effects & rehabilitation

#107: The risk of developing Type 2 diabetes after different types of colorectal cancer treatment

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Abstract
Introduction
Colorectal cancer (CRC) survivors have an increased risk of developing type 2 diabetes (T2D). It has been suggested that the cancer treatment is causally involved. The aim was to determine the impact of different types of cancer surgery as well as treatment with chemotherapy on the risk of developing T2D among CRC survivors.

Methods
This nationwide cohort study included patients operated for CRC and registered in the Danish CRC database between 2002-2018. The incidence of T2D among CRC survivors was calculated for different types of surgical resections, and the surgical subgroups were compared by cox regression adjusted for age, gender, calendar time, American Society of Anesthesiologists score, BMI and treatment with chemotherapy.

Results
We included 46,373 non-diabetic CRC survivors. During 245.466 person-years (p-y) of follow-up 2,556 individuals developed T2D. The IR of T2D was 10.4 per 1000 p-y (95% CI 9.6;11.2) after right-sided colonic resection (N=15,211), 12.6 per 1000 p-y (11.0;14.4) after left-sided colonic resections (N=3,370), 10.8 per 1000 p-y (10.1;11.6) after sigmoid resection (N=12,038) and 9.7 per 1000 p-y (9.1;10.4) after rectal resection (N=15,754). In the adjusted analysis, the impact of surgery type was small or non-significant in the risk of developing T2D, and treatment with chemotherapy turned out be insignificant. However, within each surgical subgroup, BMI had a high impact on T2D development, e.g compared to normal BMI(18.5–24.9 kg/m2) after right-sided resection, severe obesity(BMI 35-39.9) was associated with increased risk of developing T2D, adjusted hazard ratio (HR):8.0 (5.9;11).

Conclusion
The association between the type of cancer surgery and development of T2D was week and with no impact of chemotherapy treatment. However, within each surgical subgroup, BMI was strongly associated to developing T2D. This study suggests a postoperative T2D screening in CRC survivors with increased BMI, despite of cancer treatment

Morbidity, late effects & rehabilitation

#108: DAHANCA 36A: Prospective registration of morbidity after curatively intended treatment for sinonasal cancer

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Abstract
Introduction
The study aims to prospectively record treatment-induced morbidity and loco-regional control in patients diagnosed with sinonasal cancer (SNC) treated with a curative intend.

Materials and methods
The longitudinal study includes patients from all institutions in Denmark treating SNC. Eligible patients are diagnosed with carcinomas or esthesioneuroblastomas of the nasal cavity, maxillary-, sphenoid-, ethmoid-, or frontal sinus. The curatively intended treatment may encompass surgery, radiotherapy or a combination of those. All examinations are performed at baseline and at set time-points after termination of treatment. Morbidity is evaluated by the following examinations: Neuropsychological testing performed 6 and 12 months after treatment, evaluates different domains of cognitive function. MRI of the brain performed 12 months after treatment visualizes structural and functional changes of the brain with T1, T2 and diffusion weighted sequences. Ear-nose-throat assessment performed 2, 12 and 60 months after treatment assesses olfactory function, and with videoscopy evaluates synechia, crusting, and nasal flow. Questionnaires concerning quality of life, fatigue, anxiety, and sinonasal symptoms will be completed at every follow-up visit. In addition to study examinations, blood samples for the evaluation of pituitary function and ophthalmological examination assessing ocular toxicity are included in the follow up programme for SNC, and the results from these examinations will be included in the analysis of radiation-induced morbidity.

Results
Results are pending. The protocol is approved by Danish Authorities and inclusion of patients will be initiated in 2022.

Conclusions
With this study, radiation-induced morbidity can be detected and distinguished from co-morbidity not related to radiation. The results are valuable in future selection of patients to different treatment modalities.